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THOMPSON'S
COAST PILOT
AND SAILING DIRECTIONS FOR THE ^[6th ed.]
NORTH-WESTERN LAKES,

FROM

OGDENSBURG TO BUFFALO, CHICAGO, GREEN BAY,
GEORGIAN BAY AND LAKE SUPERIOR.

INCLUDING

ALL THE RIVER NAVIGATION, COURSES AND DISTANCES ON EACH LAKE,
WITH DIRECTIONS FOR ENTERING ALL THE
PRINCIPAL HARBORS THEREON.

ALSO A DESCRIPTION OF

LIGHTS AND LIGHT-HOUSES,

POSITION OF BUOYS ON THE DIFFERENT SHOALS AND CHANNELS OF
THE LAKES AND RIVERS, FROM OGDENSBURG AND PRESCOTT, ONT.,
TO DULUTH, AT THE HEAD OF LAKE SUPERIOR.

⁸
Pilot's HARBORS COMPLETED,

AND IN PROGRESS OF CONSTRUCTION, DEPTH OF WATER IN EACH
HARBOR, DANGERS TO BE AVOIDED, THE POSITION OF LIFE-SAVING
STATIONS, RULES FOR THE MANAGEMENT OF OPEN ROW
BOATS IN A SURF, BEACHING THEM, ETC., AND OTHER
VALUABLE MARITIME SUGGESTIONS, TAKEN FROM
THE U. S. LIFE-SAVING SERVICE REPORTS,
BY SPECIAL PERMISSION.

CORRECTED AND REVISED FROM THE ORIGINAL COPIES OF THOMPSON'S COAST PILOT AND THE
LATEST U. S. SURVEYS, WITH THE EXPLANATION OF NAUTICAL TERMS.

Compiled by THOS. S. THOMPSON, Licensed Pilot for the Lakes,
DETROIT, MICH.



DETROIT:
WM. A. SCRIPPS, PRINTER AND PUBLISHER.
1878.

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PREFACE.

IN presenting the sixth edition of the Coast Pilot in a new form, the subscriber would respectfully say, by the assistance of the United States Lake Surveys and his own experience of forty-three years on these Lakes, as a Pilot and Navigator, he hopes to meet the support of his old friends as well as the Young Navigator, who will find in it all that is requisite for Lake Pilotage, a description of all the late improvements of Harbors, new Lighthouses, Breakwaters, and Buoys that will be placed this season, also positions of Life Saving Stations, etc., which will make this book a valuable companion to all those who are looking forward to become Masters and Pilots. I beg to return my sincere thanks to my former patrons, and also to those who have extended the hand of friendship, in this my last effort, to produce a work that is really useful to the Lake Mariner.

THOS. S. THOMPSON, PILOT.

Remarks on the Mariner's Compass.

By frequent experiments, it has been found that compasses should not be nearer together than 4 feet 6 inches, to avoid the disturbance known to exist when two needles are placed near each other. The error from this source has, in many cases, been eight degrees. Where it is convenient, one compass to steer by is particularly recommended, and a standard compass for reference placed on the centre line of the vessel, and as far from iron work as possible—say 7 feet. Vertical iron stanchions should be at least 14 feet from the compasses. In steamboats, the compass is materially affected by the telescopic funnels, or smoke stacks, especially when hot; and when taken down, can be sensibly observed. The standard compass should be raised much higher from the decks of iron vessels than wooden ones.

I have found great difference in compasses on these lakes—hardly two will agree. In going from a vessel into a propeller or steamboat, the difference is seen immediately. No doubt that many accidents to boats and vessels have happened from this cause—not knowing how your compasses will lead you. There is no remedy for this difference, except by constant running on a route, when you will find out how your compasses will lead you; and by strict observation, the use of the LEAD, and a good look-out, you may run with safety in all pilotable waters.

Notes and Remarks on the Barometer.

When the mercury falls in the barometer it announces rain or wind, or in general what is called bad weather; and, on the contrary, when it *rises*, it announces fair weather.

When the mercury falls in frosty weather, either snow or a thaw may be expected; but if it rises in the winter, with a north or east wind, it generally betokens frost.

If the mercury sinks slowly, we may expect rain, which will probably be of some continuance; but if it rises gradually, we may expect fine weather that will be lasting.

When the barometer is fluctuating, rising and falling suddenly, the weather may be expected like it—changeable. When the mercury falls very low, there will be much rain; but if its fall is low and sudden, a high wind frequently follows. When an extraordinary fall of the mercury happens, without any remarkable change near at hand, there is some probability of a storm at a distance.

In very warm weather, the fall of the mercury indicates thunder. The barometer will descend sometimes as an indication of wind only, and sometimes rise when the wind is to the north or east.

A NE wind generally causes the barometer to rise, and it is generally low with a SW wind.

An extraordinary fall of the mercury will sometimes take place in summer previous to heavy showers, attended with thunder; but in spring, autumn and winter, it indicates violent winds.

The mercury is higher in cold than in warm weather, and lower at noon and midnight than at any other period of the day.

The mercury generally falls at the approach of new and full moon, and rises at the quadratures.

Before high tides, there is almost always a great fall of the mercury; this takes place oftener at the full than at the new moon.

The greatest changes of the barometer commonly take place during clear weather with a north wind, and the smallest risings during cloudy, rainy or windy weather, with a south or nearly south wind.

The words generally engraved on the plate of the barometer rather serve to mislead than to inform; for the changes of weather depend rather on the rising and falling of the mercury, than on its standing at any particular height. When the mercury is as high as "fair," and the surface of it is concave (which is the case when it begins to descend), it very often rains; and, on the contrary, when the mercury is opposite "rain," and the surface convex (which is the case when it begins to ascend), fair weather may be expected. These circumstances not being duly attended to, may be said to be the principal cause of many people not having a proper confidence in this instrument.

For sea service, it would be as well to read off the barometer at least three times a day, viz: at 8 A. M., noon, and 8 P. M.; and oftener if bad weather.

In Europe, if the alteration in the quicksilver should be in as great a proportion as six-tenths of an inch to twenty-four hours, sudden but not lasting changes of weather may be expected. If the alteration should be gradual, probably in the proportion of two or three-tenths to twenty-four hours, the weather indicated will be likely to last.

One-fifth of the variation of the barometer in any climate may be considered as an indication of sudden change.

If wind should follow rain, the wind may be expected to increase.

Rain following wind is likely to lull it, and the wind may be expected to abate.

Explanation of the Aneroid Barometer.

The graduation and figuring on the dial represents the perpendicular scale of the mercurial barometer. The falling of the barometer is understood to be the passage of the long or steel index from the higher to the lower number of figures, which movement comes under the same atmospheric change in which the mercury passes over part of its scale. The short pointer is simply a register, and is only movable with the fingers, to be placed over the steel index, thus enabling the observer to see more readily any movement of the index.

Rules for Barometrical Observation.

1st. There is no point at which the barometer must stand to indicate rain or wind.

2d. The judgment must be governed by the rising or falling of the barometer.

3d. The falling of the barometer indicates the approach of a storm, the extent of which will be proportionate to the amount and rapidity of the fall.

4th. Showers.—The barometer falls previously from four to twelve-hundredths of an inch, varying in time, from one to three hours. The greater and more rapid the fall, the more violent will be the shower, accompanied more or less with wind.

5th. Northeasterly storms.—The barometer falls previously from four to eight-tenths of an inch, varying in time from one to four hours, and continues falling until the storm arrives at its crisis, when the barometer begins to rise and continues rising until that part of the storm which comes from the NW passes off.

6th. Southerly storms.—The barometer falls previously from one to four-tenths of an inch, varying in time from six to twelve hours. These storms generally precede unsettled weather; at such times the barometer continues low, and very slight additional depressions are followed by rain.

A southerly storm is perhaps the most difficult to judge of by appearances, as appearances change so frequently without any real change in the atmosphere. During this class of storms, the utmost confidence should be placed in the barometer. After the first indication as above, and the barometer does not rise, but remains stationary, it is a strong indication that the storm has not all passed.

The foregoing rules are the result of long and careful observation. It must be remembered that storms occur under different circumstances in different parts of the globe, yet, taking the first three of the above rules as a basis of calculation, a short experience, with the exercise of the judgment, will enable one to determine very correctly concerning approaching changes in the weather.

TABLE OF DISTANCES

At which Objects can be seen at Sea, according to their respective elevations and the elevation of the eye of the observer.

Heights in feet.	Distances in English miles.	Distances in Nautical miles.	Heights in feet.	Distances in English miles.	Distances in Nautical miles.	Heights in feet.	Distances in English miles.	Distances in Nautical miles.
5	2.058	2.565	70	11.067	9.598	250	20.916	18.14
10	4.184	3.628	75	11.456	9.935	300	22.912	19.87
15	5.123	4.443	80	11.832	10.26	350	24.748	21.46
20	5.916	5.110	85	12.196	10.57	400	26.437	22.94
25	6.614	5.736	90	12.549	10.88	450	28.002	24.33
30	7.245	6.283	95	12.891	11.18	500	29.580	25.65
35	7.826	6.787	100	13.228	11.47	550	31.094	26.90
40	8.366	7.255	110	13.874	12.03	600	32.403	28.10
45	8.874	7.696	120	14.400	12.56	650	33.726	29.25
50	9.354	8.112	130	15.083	13.08	700	35.000	30.38
55	9.811	8.509	140	15.652	13.57	750	36.416	31.45
60	10.246	8.886	150	17.201	14.91	800	37.836	32.54
65	10.665	9.249	200	18.708	16.22	1000	41.833	36.28

RULE.—If the distance at which a light of a given height can be seen by a person on a given level be required, it is only needful to add together the two numbers in the column of distances corresponding to those in the column of heights, which represent respectively the height of the observer's eye and the height of the focal plane above the sea. When the height required to render a light visible at a given distance is required, we must first seek for the number corresponding to the height of the observer's eye, and deduct this from the whole proposed range of the light, and opposite the remainder in the column of distances, seek for the corresponding number in the column of heights. A tower, 100 feet high, will be visible to an observer, whose eye is elevated 15 feet above the water, 16 nautical miles, thus from the table:

EXAMPLE.—15 feet elevation, distance visible, 4.443 nautical miles.

100	"	"	"	"	11.47	"	"
					—		
					15.913	"	"

TABLE OF THE ANGLES

Which every Point and Quarter Point of the Compass makes with the Meridian.

Pts.	°	'	"	Pts.	°	'	"	Pts.	°	'	"	Pts.	°	'	"
1/4	2	48	45	2 1/4	25	18	45	4 1/4	47	48	45	6 1/4	70	18	45
1/2	5	37	30	3 1/4	28	07	30	4 1/2	50	37	30	6 1/2	73	07	30
3/4	8	26	15	2 3/4	30	56	15	4 3/4	53	26	15	6 3/4	75	56	15
1	11	15	00	3	33	45	00	5	56	15	00	7	78	45	00
1 1/4	14	03	45	3 1/4	36	33	45	5 1/4	59	03	45	7 1/4	81	33	45
1 1/2	16	52	30	3 1/2	39	22	30	5 1/2	61	52	30	7 1/2	84	22	30
1 3/4	19	41	15	3 3/4	42	11	15	5 3/4	64	41	15	7 3/4	87	11	15
2	22	30	00	4	45	00	00	6	67	30	00	8	90	00	00

to their respective
observer.

Distances in English miles.	Distances in Nautical miles.
20.916	18.14
22.912	19.87
24.748	21.46
26.437	22.94
28.069	24.33
29.580	25.65
31.024	26.90
32.403	28.10
33.726	29.25
35.000	30.28
37.416	32.45
39.836	34.54
41.833	36.28

seen by a person on a
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Pts.	°	'	"
6¼	70	18	45
6½	73	07	30
6¾	75	56	15
7	78	45	00
7¼	81	33	45
7½	84	22	30
7¾	87	11	15
8	90	00	00

THOMPSON'S COAST PILOT FOR THE LAKES.

Magnitude of the Lakes or "Inland Seas."

NOTHING but a voyage over all the great bodies of water forming the "Inland Seas," can furnish the tourist or scientific explorer a just idea of the extent, depth, and clearness of the waters of the Great Lakes of America, together with the healthy influence, fertility, and romantic beauty of the numerous islands, and surrounding shores, forming a circuit of about 4,000 miles, with an area of 90,000 square miles, or about twice the extent of the State of New York—extending through eight degrees of latitude, and sixteen degrees of longitude—this region, embracing the entire north half of the temperate zone, where the purity of the atmosphere vies with the purity of these extensive waters, or "Inland Seas," being connected by navigable rivers or straits.

The States washed by the Great Lakes, are New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, and Ontario—the boundary line between the United States and the British Possessions running through the centre of Lakes Superior, Huron, St. Clair, Erie and Ontario, together with the connecting rivers or straits, and down the St. Lawrence River to the 45th parallel of latitude. From thence the St. Lawrence flows in a northeast direction through Canada into the Gulf of St. Lawrence. The romantic beauty of the rapids of this noble stream, and its majestic flow through a healthy and rich section of country, is unsurpassed for grand lake and river scenery.

LAKE SUPERIOR, the largest of the Inland Seas, lying between 46° 30' and 49° north latitude, and between 83° 30' and 92° 30' west

longitude from Greenwich, is situated at a height of 600 feet above the Gulf of St Lawrence, from which it is distant about 1,500 miles, by the course of its outlet and the St. Lawrence River. It is 460 miles long from east to west, and 170 miles broad in its widest part, with an average breadth of 85 miles; the entire circuit being about 1,200 miles. It is 800 feet in greatest depth, extending 200 feet below the level of the ocean. Estimated area, 31,500 square miles, being by far the largest body of fresh water on the face of the globe—celebrated alike for its sparkling purity, romantic scenery, and the healthy influence of its surrounding climate. About one hundred rivers and creeks are said to flow into the lake, the greatest part being small streams, and but few navigable except for canoes, owing to numerous falls and rapids. It discharges its waters eastward, by the straits, or River *St. Mary*, 60 miles long, into Lake Huron, which lies 26 feet below, there being about 20 feet descent at the Sault Ste. Marie, which is overcome by means of two locks and a ship canal. Its outlet is a most lovely and romantic stream, embosoming a number of large and fertile islands, covered with a rich foliage.

LAKE MICHIGAN, lying about 576 feet above the sea, is 320 miles long, 84 miles broad, and 700 feet deep; area, 22,000 square miles. This lake lies wholly within the confines of the United States. It presents a large expanse of water, with but few islands, except near its entrance into the straits of Mackinac, through which it discharges its surplus waters. The strait is 30 or 40 miles in length, and discharges its accumulated waters into Lake Huron, on nearly a level with Lake Michigan. At the north end of the lake, and in the straits, are several large and romantic islands, affording delightful resorts.

GREEN BAY, a most beautiful expanse of water, containing several small islands, lies at about the same elevation as Lake Michigan; it is 100 miles long, 20 miles broad, and 60 feet deep; area, 2,000 square miles. This is a remarkably pure body of water, presenting lovely shores, surrounded by a fruitful and healthy section of country.

LAKE HURON, lying at a height of 574 feet above the sea, is 250 miles long, 100 miles broad, and 750 feet greatest depth; area, 21,000 square miles. This lake is almost entirely free of islands, presenting a large expanse of pure water. Its most remarkable feature is Sagi-

naw Bay, lying on its western border. The waters of this lake are now whitened by the sails of commerce, it being the great thoroughfare to and from Lakes Michigan and Superior.

GEORGIAN BAY, lying northeast of Lake Huron, and of the same altitude, being separated by islands and headlands, lies wholly within the confines of Canada. It is 140 miles long, 55 miles broad, and 500 feet in depth; area, 5,000 square miles. In the *North Channel*, which communicates with St. Mary's River, and in Georgian Bay, are innumerable islands and inlets, forming an interesting and romantic feature to this pure body of water. All the above bodies of water, into which are discharged a great number of streams, find an outlet by the River *St. Clair*, commencing at the foot of Lake Huron, where it has only a width of 1,000 feet, and a depth of from 20 to 60 feet, flowing with a rapid current downward, 38 miles, into

LAKE ST. CLAIR, which is 25 miles long and about as many broad, with a small depth of water. *Detroit River*, 27 miles in length, is the recipient of all the above waters, flowing southward through a fine section of country into

LAKE ERIE, the *fourth* great lake of this immense chain. This latter lake again, at an elevation above the sea of 564 feet, 250 miles long, 60 miles broad, and 204 feet at its greatest depth, but on an average, considerably less than one hundred feet deep, discharges its surplus waters by the Niagara River and Falls, into Lake Ontario, 330 feet below; 51 feet of this descent being in the Rapids immediately above the Falls, 160 feet at the Falls themselves, and the rest chiefly in the Rapids between the Falls and the mouth of the river, 22 miles below Lake Erie. This is comparatively a shallow body of water; and the relative depths of the great series of lakes may be illustrated by saying, that the surplus waters poured from the vast *basins* of Superior, Michigan and Huron, flow across the *plate* of Erie into the deep *bowl* of Ontario. Lake Erie is reputed to be the only one of the series in which any current is perceptible. The fact, if it is one, is usually ascribed to its shallowness; but the vast volume of its outlet—the Niagara River—with its strong current, is a much more favorable cause than the small depth of its water, which may be far more appropriately adduced as the reason why the navigation is obstructed by *ice* much more than either of the great lakes.

LAKE ONTARIO, the *fifth* and last of the Great Lakes of America, is elevated 234 feet above tide-water at Three Rivers, on the St. Lawrence; it is 180 miles long, 60 miles broad, 600 feet deep.

Thus *basin* succeeds *basin*, like the locks of a great canal, the whole length of waters from Lake Superior to the Gulf of St. Lawrence being rendered navigable for vessels of a large class by means of the Welland and St. Lawrence Canals—thus enabling a loaded vessel to ascend or descend 600 feet above the level of the ocean or tide-water. Of these five great lakes, Lake Superior has by far the largest area, and Lake Ontario has the least, having a surface only of about one-fifth of that of Lake Superior, and being somewhat less in area than Lake Erie, although not much less, if any, in the circuit of its shores. Lake Ontario is the safest body of water for navigation, and Lake Erie the most dangerous. The lakes of greatest interest to the tourist or scientific traveler are Ontario, Huron, together with Georgian Bay and North Channel, and Lake Superior. The many picturesque islands and headlands, together with the pure, dark green waters of the Upper Lakes, form a most lovely contrast during the summer and autumn months.

The altitude of the land which forms the water-shed of the *Upper Lakes* does not exceed from 600 to 2,500 feet above the level of the ocean, while the altitude of the land which forms the water-shed of Lake Champlain and the lower tributaries of the St. Lawrence River rises from 4,000 to 5,000 feet above the level of the sea or tide-water, in the States of Vermont and New York.

The divide which separates the waters of the Gulf of Mexico, from those flowing northeast into the St. Lawrence, do not in some places exceed ten or twenty feet above the level of Lakes Michigan and Superior; in fact, it is said that Lake Michigan, when under the influence of high water and a strong northerly wind, discharges some of its surplus waters into the Illinois River, and thence into the Mississippi and Gulf of Mexico—so low is the divide at the southern terminus.

When we consider the magnitude of these Great Lakes, the largest body of fresh water on the globe, being connected by navigable straits or canals, we may quote with emphasis the words of an Eng-

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lish writer : "How little are they aware, in Europe, of the extent of commerce upon these 'Inland Seas,' whose coasts are now lined with flourishing towns and cities; whose waters are plowed with magnificent steamers and vessels—numbering 5,496—shows the rising importance of these great lakes, as connected with the Far West."



Lake Ontario.

Ogdensburg Lighthouse near the mouth of Oswegatchie River, in St. Lawrence River, on a square tower, with dwelling attached, built of Limestone, on a low Island, one fourth of a mile N by W of the mouth of the River. A shoal extends out northerly from the Island, is a Fixed White Light, visible $12\frac{1}{2}$ miles, 42 feet above Lake level.

Channel to Ogdensburg Harbor, black buoy, spar in 11 feet of water. This buoy is on the eastern side of the dredged channel on the outer bar of Ogdensburg Harbor. Ogdensburg Lighthouse $S\frac{1}{4}W$, 522 yards.

Outer Buoy, red spar buoy in 12 feet water, bearings Ogdensburg lighthouse, $S\frac{1}{2}E$, 493 yards. The red buoys should be kept well aboard in passing in and out, as there is a strong current setting toward the opposite or Northeasterly bank of the channel.

Middle Buoy, red, spar buoy, in 10 feet water, Ogdensburg Lighthouse, bearing $S\frac{1}{2}W$, 300 yards.

Inner Buoy, red spar buoy in 10 feet water, Ogdensburg Lighthouse bearing SSW 133 yards. After passing this buoy steer for the warehouse of the R. W. & O. Railroad on the first wharf.

Windmill Point Lighthouse one and one quarter miles above Fort Wellington, Prescott, Ontario. A fixed white light, visible 15 miles. Round stone Tower 92 feet above River level.

Cole's Shoal Lighthouse, on pier, 5 miles west of Brockville and $\frac{3}{4}$ mile from North shore, Ontario.

Cross-over Island Lighthouse on Cross-over Island, St. Lawrence River. Fixed white light, visible 12 miles 37 feet above Lake level. A River Light shown from keeper's dwelling, brick front and rear, natural color, gables sheathed with boards and painted white. Cross-over Island is on the north side of the channel and is 20 miles southwest from Ogdensburg.

Bay State Shoal, red spar buoy, north side of channel below Cross-over lighthouse in 5 feet water.

Whale's Back Shoal, black spar buoy, south side of channel above Whale's back in 8 feet water.

Superior Shoal, black spar buoy, south side of channel, off Chippawa point in 3 feet water.

Oneida Shoal, red spar buoy, north side of channel above Cross over Island Lighthouse, in 4 feet water.

Lower Sister Island shoal, black spar buoy south side of channel, and north side of the Island in 7 feet water.

Sister Islands Lighthouse, on Sister Island, St. Lawrence River, on the lower of the Three Sisters. Fixed white light visible 13 miles, 43 feet above Lake level, shows the entire horizon. A River light, square tower rises from keeper's dwelling, both built of limestone. Bears from Alexandria Bay NE, distance about 7 miles. The Islands are on the south side of the channel.

Sunken Rock Lighthouse, on Bush or Sunken Rock Island, in the St. Lawrence River. Fixed white light visible 11 miles, 31 feet above River level. A River light, brick beacon, with an exterior sheathing of shingles, whitewashed, on pier of protection, one fourth of a mile north of Alexandria Bay. Shoal is on north side of channel.

Sunken Rock, black spar buoy, west of Sunken Rock Lighthouse, opposite Alexandria Bay.

Frontinac Shoal, red spar buoy, north side of channel, opposite Alexandria Bay in 3 feet water.

Channel Buoy, black spar buoy, south side of channel, opposite Alexandria Bay.

Channel Buoy, red spar buoy, north side of channel, opposite Pulman's Island, bearings Sunken Rock Lighthouse NE $\frac{1}{2}$ E.

Niagara Shoal, black spar buoy, south side of channel, below Rock Island Lighthouse.

Granite State Shoal, red spar buoy, north side of channel, below Rock Island Lighthouse.

Rock Island Lighthouse, in St. Lawrence River. Fixed white light visible 15 miles, 67 feet above River level. A River light, keeper's dwelling of brick, with light on top, bears from Alexandria

Bay SW by W, distant about 7 miles. Rock Island is on the South side of the channel.

Rock Island Reef, black spar buoy, on west end of the reef off Rock Island, in 5 feet water.

Feather Bed Shoal, black ballon buoy, with white top, west end of the shoal off the head of Cowleton Island, in 2 feet water.

Tibbett's Point Lighthouse, on the Southeast side of the entrance to St. Lawrence River. Fixed white light visible 15 miles, 67 feet above Lake level. Lake coast and River light, stone dwelling, connected by covered way with conical tower, whitewashed. Bearings Galoo Islands S by W 19 miles; Charity Island or shoal SW by W distant 8 miles; Pigeon Island, (Canada Light) W $\frac{1}{2}$ S, distant 10 miles.

Charity Shoal, black iron can buoy in $5\frac{1}{2}$ feet water. This buoy is placed on the Southeast side or end of the Shoal; $2\frac{1}{2}$ fathoms of water close to, the channel is to the Southward or Eastward of the buoy.

Galoo Island Lighthouse, on the west point of Galoo Island, N. of Lake Coast Light. Fixed white light visible 14 miles, 62 feet above Lake level. Conical tower and dwelling of limestone, connected by covered way; a shoal N by W, distant 1 mile is marked by a buoy.

Galoo Island Shoal, red nun buoy, with staff. This shoal is about 100 yards in length and 30 in width, with a depth of water varying from $2\frac{1}{2}$ to 6 feet, rocky bottom. The buoy in $2\frac{1}{2}$ fathoms of water, on the southeast end, and northwest side of the shoal. Bearings Galoo Island Lighthouse, S by E, one mile Stony Point Lighthouse, ESE 8 miles.

Sackett's Harbor Lighthouse, on the middle of Horse Island, and west of Sackett's Harbor, N. Y. Fixed white light visible $13\frac{1}{2}$ miles, 49 feet above Lake level, a harbor light, dwelling with square tower attached, of brick. The Island is on the south side of entrance to harbor, $1\frac{1}{2}$ miles west of Sackett's Harbor, and is connected with the main land by a narrow spit, visible at low water. Bearings Sackett's Harbor, E $\frac{1}{2}$ N, $1\frac{1}{2}$ miles. Point Peninsular, WNW 5 miles.

Stony Point Lighthouse, on Stony Point, N. Y. Fixed varied by

white flashes, time between flashes two minutes, visible 13 miles, 45 feet above Lake level. Lake coast light, square tower and dwelling attached, of limestone. Shore rocky and dangerous, and can only be approached in small boats, in smooth water. Oswego Light S by W 35 miles, bearings Galloo Island Lighthouse, N by W $\frac{1}{2}$ W, 7 miles.

Oswego Lighthouse, on west pier at the entrance of Oswego Harbor. Fixed white light visible 15 miles, 72 feet above Lake level. Lake Coast and Harbor Light. Octagonal tower and oil room attached, of lime stone, the light is 500 feet from Pier head.

COURSES AND DISTANCES ON LAKE ONTARIO.

From Port Dalhousie to the Ducks Lighthouse.

E by N $\frac{3}{4}$ N 136 miles; thence NE $\frac{1}{2}$ N 22 miles, to Nine Mile Point Lighthouse; thence 4 miles along the shore of Simcoe Island, to abreast of Four Mile Point, with Snake Island red light to port. The channel here is about $\frac{3}{4}$ of a mile wide; you will have from 3 to 4 $\frac{1}{2}$ fathoms water. Keep Four Mile Point well aboard, in 4 $\frac{1}{2}$ fathoms; when clear of the point, steer for Kingston: haul round the west point of the harbor, and come to off the old wooden Lighthouse in 6 fathoms water, soft bottom, or run alongside the docks.

Garden Island is directly opposite Kingston Bay, and is the principal timber port.

From Port Dalhousie to Oswego.

Run out of the harbor 2 miles NNE; thence E by N $\frac{3}{4}$ N 30 miles; thence E $\frac{1}{4}$ N northerly 106 miles, to Oswego.

From Oswego to Kingston north 60 miles, leaving the Real Ducks Island to port, Pigeon Island and the Charity Shoals to starboard, also Nine Mile Point Lighthouse, Simcoe Island, and run for Kingston as directed before.

From Oswego to Long Point, Ont., NW $\frac{1}{2}$ W 41 miles.

From Oswego to Galloo Island N $\frac{3}{4}$ E 30 miles; thence to Tibbett's Point N by E $\frac{3}{4}$ E 19 miles.

From False Ducks to Tibbett's Point NE by $E\frac{1}{2}E$ $24\frac{1}{2}$ miles.

From Real Ducks to Tibbett's Point NE $\frac{3}{4}N$ 19 miles. Good holding ground under the Real Ducks Island in 5 to 7 fathoms, blue clay.

From Genesee River to False Ducks Island NE $\frac{1}{4}N$ 65 miles.

From Stony Island to Oswego, SSW 30 miles.

From Welland Canal to Toronto N $\frac{1}{2}W$ $29\frac{1}{2}$ miles.

From Welland Canal to Credit River NNW $\frac{1}{2}W$ 27 miles.

From Niagara to Toronto NW by N 30 miles.

From Port Dalhousie to Genesee River Eighty-Six and One-Half miles, as follows:

NNE 3 miles; E by N $\frac{3}{4}N$ 40 miles; thence E $\frac{3}{4}S$ southerly $17\frac{1}{2}$ miles; thence E by S $\frac{3}{4}S$ 19 miles, to Braddock's Point; thence SE $\frac{1}{2}E$ 7 miles, to the piers.

Port Dalhousie Harbor

Is the entrance to the Welland Canal. This is an easy harbor to make. In beating up towards the harbor, close in, keep out of range of the ends of the piers, as the water shoals quickly inside that range. The piers are 3,000 feet long, 200 feet apart, and run out from the bend southwest of the lock N&S. There is a middle ground opposite the bend in the west pier. Vessels can pass on either side of it. The railroad station is on the east side of the harbor, 12 miles from Niagara River.

Sackett's Harbor is situated on the SE side of Black River Bay, and W by N from Point Peninsula, 9 miles distant. The Lighthouse stands on a rock, called Horse Island, at the southwestern point of Black River Bay, $1\frac{1}{2}$ miles west of the harbor. It shows a fixed bright light. To enter this harbor from the lake, run past Stony Point light, and follow the land along, keeping the starboard hand best aboard to clear a middle ground which lays off the south end of Stony Island, nearly mid-channel, haul up for Horse Island Lighthouse, pass it pretty close to, and run round the point and into the Bay of Sackett's. There is a good channel on either side of Great Galloo, Little Galloo and Stony Island.

Salmon River, or port Ontario, 20 miles east of Oswego.

Salmon River, or Port Ontario, is twenty miles NE by E from Oswego, and north of Mexico Bay; has two good piers, with plenty of water. The Lighthouse is on the North Pier end, is 52 feet high, and shows a white light. The land both north and south of the harbor is very low, and cannot be seen at any great distance.

Big Sodus Bay is 32 miles WSW $\frac{1}{2}$ S of Oswego, and 36 miles E $\frac{1}{2}$ N from Genesee River—the most capacious harbor on the south shore of Lake Ontario. It is entered from the lake by a channel 470 feet wide, between piers which extend out into 13 feet water. The main light is on the hill to the westward of the harbor, and the beacon light on the west pier head; depth of water going in 9 to 12 feet, inside the bay 20 to 40 feet.

Genesee River is protected by piers running into the lake 2,000 feet NE and SW, and 400 feet apart. To run in between the piers, bring the pier light to bear SSE, and haul up, giving the west pier end a berth of 50 feet.

Burlington Canal (Ontario) light, fixed, visible 12 miles, on the middle of the south pier, at the entrance to Burlington Bay, Hamilton. Beacon light on the end of south pier.

To enter the bay, open the Beacon light about handspike wide with the main or inner light, and run in between the piers; thence about WSW up to abreast of Hamilton docks, 4 $\frac{1}{2}$ miles. Depth of water in the bay from 2 to 5, 7, 9 and 12 fathoms.

Toronto Harbor, Ontario.

This spacious bay is one of the best harbors on Lake Ontario. It is nearly circular, and formed by the mainland on the north and a long, low narrow spit of land on the east, south and southwest, called the Peninsula or Island. It extends in a southwesterly direction from the highlands, in the township of Scarboro', upon which trees of stunted growth are thickly scattered. Thus is inclosed a beautiful basin, about 2 $\frac{1}{2}$ miles in diameter, capable of containing a large fleet of vessels.

To run into Toronto Bay, give Gibraltar Lighthouse a berth of 1 mile, and run in north for the harbor lights, which keep in range until

well up to the wharf; then follow the buoys round, leaving them on the starboard hand, two red buoys to the westward, and two white buoys to the eastward; thence straight up the bay, in line with the wharfs, or come to in any part of the bay, in 18 to 22 feet water. The depth of water between the piers and the buoys is 11 to 12 feet, and is being deepened every year. A sandy shoal stretches into the lake a quarter of a mile, in a SW direction off Gibraltar Point, and continues along the west side of the island, to the entrance of the bay, due north, to the buoys, at an average distance of a quarter of a mile from the island, with 5 to 6 feet water on it, and at the point drops off suddenly to 12 and 20 feet.

DANGER.—There is a large boulder stone, in 5 feet water, nearly midway between the Queen's and Garrison wharfs, and a little to the south of them. To make lee under the island, come to in from 5 to 6 fathoms.

NOTE.—In running up the lake for Toronto Harbor, keep $2\frac{1}{2}$ miles from the shore, so as to open Gibraltar light from the projection of the island, where the highest trees are. A channel has formed at the east end of the bay, with 5 or 6 feet water in it, by the force of the sea in heavy gales. It was proposed some few years ago to cut a channel through here, but was given up, supposing it would spoil the western entrance. It will now be proved by this break in the narrow neck of the Peninsula, whether it will have that effect at the western entrance or not.

The Port of Liverpool or Pickering, Formerly Called Frenchman's Bay.

This port is 26 miles $NE\frac{1}{2}E$ of Toronto. It is formed by a bay running into the land, and separated from the lake by a sandy and gravelly beach, through which is a cut 100 feet wide.

The harbor itself is well sheltered, being completely land-locked; but from the foulness of the bottom (principally from weeds) an anchor will not hold during a hard blow.

The average depth of water inside the bay is 9 feet 6 inches; at the outer mouth, between the piers, 11 feet 6 inches; and the inner mouth 7 feet 6 inches.

Through the cut into this harbor, a current runs in and out with great regularity, once in about every four minutes.

Whitby Harbor.

Six miles to the eastward of Liverpool, and 34 miles NE by E of Toronto, one of the best and most secure harbors on the north shore. It stands near the center of a deep bay, between Raby Head, on the east, and Scarboro' Heights on the west, and three and a half or four miles north of a line drawn between these two points. The harbor is formed by a strong breakwater of crib work, stretching across the head of the bay, by which it is separated from the lake, and forms a large basin, the entrance to which is at its eastern extremity, between piers running south a considerable distance into the lake, 250 feet apart, with 13 to 14 feet water in the channel. The west pier is much longer than the east pier.

A strong tide or current sets in and out of this harbor, which at times is so strong as to turn a vessel's head round, when entering with a light wind. To enter the harbor, run through between the piers and haul up for the red warehouse, and round to with your head to the SW, in 14 feet water.

DANGER.—Midway between Whitby and Liverpool, there is a shoal in shore, one mile west of the township line.

Oshawa.

The Port of Oshawa is 6 miles east of Whitby. It is situated in the bend of a small bay, and consists of a well constructed pier running out from the mainland into 10 feet water. At the south end of the pier is a storehouse, painted red, and under the angle formed by the roof is placed a large lamp, which serves the purpose of a lighthouse.

This port is well protected from any wind north of E and W, but is exposed to southerly winds. The west side of the Bay of Oshawa is formed by a high clay bank, almost perpendicular towards the lake, on the extreme point of which stand three or four trees.

DANGER.—The east point is called Oshawa Island, bearing south by east from the pier. The water here is very shoal, and a reef of large boulders extends into the lake SE, for 400 yards, which must be given a wide berth. From the point of land about midway between Whitby and Oshawa there is another reef of large boulders running out ESE into the lake.

Port Darlington

Is 8 miles to the eastward of Oshawa, 50 miles ENE of Toronto, and 29 miles WbyS of Cobourg.

This port has been much improved by extending the piers into 12 feet water, and dredging the land-locked basin within, where vessels drawing 9 feet or less may lie in safety in any weather. The west pier extends about 30 feet farther south than the east pier, which breaks the rolling sea from the SW. The light is on the east pier, and visible but a short distance.

One and one-half miles west of Darlington, is Raby Head, a high clay bluff point, destitute of trees or bushes.

Bond Head or Port of Newcastle.

Between 4 and 5 miles, E by N of Darlington, is the Port of Bond Head. It consists of a pier run out into 10 feet water; but from its exposed situation, can only be approached in fine weather, or when the wind is off shore.

DANGER.—Four miles east of this port, there is a large boulder, some distance in the lake, called the Peach Stone, and four miles east of this again, there is a reef of boulders, extending 300 yards into the lake, in a southerly direction off the headland. Course to clear these reefs, bound to Cobourg, $E\frac{1}{2}N$, 20 miles, giving the shore a berth of 1 mile; thence $NE\text{ by }E\frac{1}{2}E$ for Port Hope, and $ENE\frac{1}{4}E$ for Cobourg.

Port Hope

Is 23 miles $E\frac{1}{2}N$ of Darlington, which is formed by running two rows of piers into 13 feet water, having a basin at their inner or northern extremity. During a SE or SW gale, this port cannot be made by large vessels, drawing over 9 feet water, with safety, owing to the tremendous swell rolling in from the lake; besides which, the piers being only 125 feet apart at the mouth, and the basin very small, there is no room to check the speed of a vessel, or to snub her without danger to herself or others. During a southerly gale, also, the swell in the basin is so great as to cause vessels to lay uneasy. From any wind N of E or W, this is a perfectly safe and snug harbor.

Cobourg.

The Harbor of Cobourg is situated seven miles east of Port Hope, and is formed of pier work. A shifting bar of sand is thrown up during a SW gale, which renders the entrance to it still more dangerous than Port Hope for vessels of deep draught. The harbor is more capacious, and when once entered more secure than that of Port Hope, having a second or inner basin with plenty of water, where no sea can injure or disturb the vessels lying there. The mouth of the harbor is 130 feet wide, with water varying from 10 to 13 feet. The Lighthouse is on the east pier, 20 feet high, and visible 8 miles.

DANGER.—In entering this port, at night, care must be taken not to run too close to the south end of the west pier, where broken crib work and numerous piles project nearly 100 feet farther into the lake than the end of the east pier.

SHOAL.—Midway between Port Hope and Cobourg there is a dangerous shoal, called Gull Island, which is about two miles long, and one mile from the shore. It is sometimes bare, and has a Lighthouse erected upon it, 45 feet high, showing a bright, fixed white light, and visible 10 to 12 miles. In passing this shoal give it a berth of two miles.

Grafton.

This village is about 8 miles east of Cobourg, has a pier run out into 10 feet water.

Colborne

Is a village 8 or 9 miles below Grafton; has a pier for the accommodation of trading craft. Both these ports are exposed to the heavy seas of the lake, and afford no shelter to vessels, except when the wind is off shore.

DANGER.—One mile west of Colborne there is a projecting point, off which is a reef of boulders. In approaching Colborne give the point a good berth.

Presqu'île Harbor.

The West Bluff of Presqu'île is 24 miles E $\frac{1}{4}$ N of Cobourg, well wooded, and has 90 feet water close in shore. Five miles NE by E

off this point brings you abreast of the Lighthouse, which is 67 feet high, and shows a bright white light, visible 12 to 15 miles. Give the Lighthouse point a berth of half a mile, to clear a shoal that sets off from it, in a southerly direction, haul up N by E for the lone pine tree, until the inner range lights are in line; then haul up SW, keeping within fifty yards north of the beach of the first range light station, as there is 18 to 22 feet water close to it. When past this point come to, between the two range points, in 18 feet water.

DANGER.—Between the main Lighthouse, on the SE point, and the range light on the NE point, extending in a northeasterly direction, is a shoal $\frac{3}{4}$ of a mile long, and forms a triangular point, called the Middle Ground, with 4 to 6 feet water on it, which you have to haul round in going into the harbor.

To the north of the Lighthouse built on the NE point, running out from the mainland, there is a low marshy spit, destitute of timber, and easily recognized by a large dead elm tree, bearing north of the Lighthouse. This point is called Elm Tree Point. The channel here is about half a mile wide. WNW of the second range light, there is another small shoal, called Four Acre shoal, nearly half a mile from the shore, with plenty of water all around it. Two miles ESE of the main Lighthouse, there is a dangerous rocky shoal in the lake, with 3 to 5 feet water on it. It is to the eastward of the course from the Lighthouse to Scotch Bonnet. SE from this shoal is another small shoal, with 5 feet water on it. These shoals obstruct the entrance to Weller's Bay.

South Bay Point.

Good anchorage and shelter can be found inside South Bay Point; to make it, keep the Outer Duck Island to the eastward and the Inner Duck to the northward, and come to off the NE point, or make fast to the dock. In leaving this anchorage, bound for Kingston, if the wind is favorable, a passage can be made by passing through the Upper Gap, between Indian Point on the west and Amherst Island on the east. Steer N by E, till between Amherst Island and the mainland. Thence ENE, till north of the Brother's Islands. Thence east to Kingston. Good anchorage can be found on the NE side of the Real Duck Island.

Kingston.

Kingston Harbor is one of the best harbors on Lake Ontario. There are three channels by which it may be made from the lake ; The Bateau Channel, between Wolf and Long Island and Simcoe Island, leaving Hare Island also to starboard, as you enter. This channel has from 12 to 18 feet water in it. The south channel, between Simcoe Island and Snake Island. This is a good deep channel ; run through, giving Simcoe Island a berth of $\frac{1}{2}$ to $\frac{3}{4}$ of a mile, and when abreast of Four Mile Point haul off for Kingston. The North or Old Ship Channel is the best channel of the three, and has 4 to 10 fathoms water. To run this channel haul off towards Amherst Island, and when Cedar Island (which is close under Fort Henry) is open with Snake Island, steer for Fort Henry, and run up to the harbor ; you leave Snake Island to starboard and Salmon Island to port.

COURSES AND DISTANCES ON LAKE ONTARIO.

(According to the Chart of Captain Ford, U. S. Navy.)

From Sackett's Harbor to mid-channel between Stony Point and Stony Island SW by W 12 miles.

From Stony Point to False Ducks WNW 25 miles.

From Fort Tomkins to Real Ducks W $\frac{1}{2}$ N 22 miles.

From NE end of Stony Island to the West end of Grenadier Island NNW 11 miles.

From Stony Point to Long Point W $\frac{1}{4}$ N 45 miles.

From Stony Point to Burlington Bay and Hamilton 180 miles.

From Stony Point to the Devil's Nose WSW $\frac{1}{2}$ W 95 miles.

From Stony Island to Fort Niagara W by S $\frac{1}{4}$ S 145 miles.

From Snake Island to Navy Point NE by E 6 miles.

From Snake Island to Four-Mile Point E $1\frac{1}{4}$ miles.

From Three Sisters to Snake Island, ESE $4\frac{1}{2}$ miles.

From the NE end of Stony Island to middle of Charity Shoal NNW 14 miles.

From Oswego to Real Ducks N 35 miles.

From Oswego to Long Point NW $\frac{3}{4}$ W 40 miles.

From Oswego to Bay Quinte N by W 47 miles.

From Nine-Mile Point east of Oswego to Stony Point N by E $\frac{1}{4}$ E 21 miles; and from Nine-Mile Point west of Oswego to Stony Point NE $\frac{1}{2}$ N $35\frac{1}{2}$ miles.

From Oswego to Thirty-Mile Point W 100 miles.

From Oswego to Big Sodus WSW 9 miles; thence SW by W $\frac{1}{2}$ W 17 miles.

From Oswego to Toronto W $\frac{3}{4}$ N 135 miles.

From mid-channel between Point Peninsula and Stony Island to Fifth-Town Point, Upper Gap, Bay Quinte, WNW 26 miles.

From the anchorage at the Real Ducks to Nine-Mile Point, off Simcoe Island, N by E 18 miles.

From Real Ducks to Upper Gap of the Bay Quinte NNW $\frac{1}{4}$ W 14 miles.

From anchorage at the Real Ducks to south side of False Ducks, W $8\frac{1}{2}$ miles.

From False Ducks to Upper Gap N 9 miles.

From mid-channel between the Real and False Ducks to Ship Island, between Snake Island and Salmon Island, NE by N 22 miles.

From Long Point to the channel between the Scotch Bonnet and Nicholson's Island WNW 17 miles.

From Long Point to Toronto W by S 100 miles.

From Toronto to Burlington Bay SW 32 miles.

From Toronto to Fort Niagara SE by S $28\frac{1}{2}$ miles.

From Burlington Bay to Niagara River E by S 32 miles.

From False Ducks to Long Point WSW 25 miles.

From Genesee River to Presqu'ile N 55 miles.

From Genesee River to mid-channel between Real and False Ducks SW 73 miles.

From Big Sodus to entrance of the channel between the Real and False Ducks NNE 50 miles.

From Devil's Nose to Toronto W by N $\frac{3}{4}$ N 60 miles.

From Niagara River to Presqu'ile NE by E 75 miles.

From Genesee River to Port Hope NW by N 58 miles.

From Thirty-Mile Point to Fort Niagara WSW 26 miles.

From Tibbett's Point to Jordan Point W by N $\frac{1}{2}$ N 5 miles.

From Tibbett's Point to Pigeon Island $W\frac{1}{2}S$ 8 miles.

From Gravelly Point to Tibbett's Point $SW\frac{1}{4}S$ 3 miles.

From Grenadier Island to anchorage off the Real Ducks NE by E 11 miles.

From Upper Gap of Bay Quinte to the Three Sister Islands, at the lower end of Amherst Island, ENE 9 miles.

From Duffin's Bay to Niagara S by W 40 miles.

From Big Sodus to Presqu'île NW by N 60 miles.

From Big Sodus to Long Point N by W 38 miles.

From Nine-Mile Point, west of Oswego, to Braddock's Point $W\frac{1}{4}S$ 52 miles.

Oakville.

The Port of Oakville is 2 miles $W\frac{1}{2}S$ from Toronto, and 14 miles NE by N from Burlington Canal. The piers are 100 feet apart, and run out nearly north and south into the lake.

DANGER —Between the port and Port Credit there is a shoal, and numerous large boulders, extending a considerable distance out from the shore, which should not be approached nearer than a mile.

Wellington Square and Nelson.

These small ports are situated between Oakville and the Burlington Canal. Their docks run out into 10 feet water. No protection from east and south or southeast winds.

SAILING DIRECTIONS FOR LAKE ONTARIO.

(From U. S. Survey. All bearings are true, and distances Statute Miles.)

From Port Dalhousie to Kingston.

When 4 miles north of Port Dalhousie light, steer E by $N\frac{3}{4}N$ for 131 miles to a point 4 miles south of False Ducks light, when steer NE by N on range of Snake Island light, passing $\frac{3}{4}$ of a mile to the westward of Simcoe Island light for 22 $\frac{1}{2}$ miles to a point one mile $N\frac{1}{2}W$ of Simcoe Island light; thence $N\frac{3}{4}W$ for 2 $\frac{1}{2}$ miles, until Snake Island light bears $SE\frac{1}{2}$ miles; thence E by $N\frac{3}{4}N$, keeping within one-quarter of a mile from the north shore for 4 miles until abreast of Kingston.

From Port Dalhousie to Cape Vincent.

When 4 miles north of Port Dalhousie light, steer E by $N\frac{3}{4}N$ 131 miles, to a point 4 miles south of False Ducks light; thence NE $\frac{3}{4}E$, passing Pigeon Island light $2\frac{1}{2}$ miles to port, and Tibbitt's Point light one mile to the starboard for 28 miles, until abreast of Cape Vincent. Note that this route passes half a mile north of Charity Shoal, upon which there is only five feet water. See buoys.

From Port Dalhousie to Oswego.

When 4 miles north of Port Dalhousie light, steer E by $N\frac{3}{4}N$ 42 miles, until Thirty Mile Point bears south $6\frac{1}{2}$ miles distant; thence due east 99 miles to a point one mile north of Oswego Lighthouse.

From Niagara River to Kingston.

When one mile NW from Fort Niagara, steer north three miles; thence E by $N\frac{3}{4}N$ 121 miles to a point 4 miles south from False Ducks Lighthouse; thence as above for Kingston from Port Dalhousie.

From Niagara River to Cape Vincent.

When one mile NW from Fort Niagara light, steer north three miles; thence E by $N\frac{3}{4}N$ 121 miles to a point 4 miles south from False Ducks; thence as above from Port Dalhousie.

From Niagara River to Oswego.

When one mile NW from Fort Niagara light, steer north three miles; thence E by $N\frac{3}{4}N$ 32 miles until Thirty Mile Point Lighthouse bears south $6\frac{1}{2}$ miles distant; thence due east 99 miles, to a point one mile north of Oswego light.

From Oak Orchard to Kingston.

When two miles north of Oak Orchard light, steer NE by $E\frac{3}{4}E$ 77 $\frac{1}{2}$ miles to a point 4 miles south of False Ducks light; thence as above from Port Dalhousie.

From Oak Orchard to Cape Vincent.

When two miles north of Oak Orchard light, steer NE by $E\frac{1}{2}E$ 77 $\frac{1}{2}$ miles to a point 4 miles south of False Ducks; thence as above from Port Dalhousie.

From Charlotte to Kingston.

When three miles $NE\frac{3}{4}N$ from Genesee Beacon, and in range of the Genesee lights, steer $NE\frac{1}{4}N$ $56\frac{1}{2}$ miles to a point 4 miles south from False Ducks Light; thence as above from Port Dalhousie to Kingston.

From Charlotte to Cape Vincent.

When three miles $NE\frac{3}{4}N$ from Genesee Beacon, and in range of the Genesee lights, steer $NE\frac{1}{4}N$ $56\frac{1}{2}$ miles to a point 4 miles south from False Ducks light; thence as above from Port Dalhousie to Cape Vincent.

From Big Sodus to Kingston.

When two miles $N\frac{1}{4}E$ from the outer beacon, and in range of the two beacons at Big Sodus, steer N by $E\frac{3}{4}E$ $61\frac{3}{4}$ miles to a point three-quarters of a mile west of Simcoe Island light, when steer toward Simcoe Island light NE by N for $1\frac{1}{4}$ miles to a point one mile $N\frac{1}{4}W$ of Simcoe Island light; thence to Kingston as above from Port Dalhousie.

From Big Sodus to Cape Vincent.

When two miles $N\frac{1}{4}E$ from the outer beacon, and in range of the two beacons at Big Sodus, steer NE by $N\frac{1}{2}N$ 62 miles, until Tibbitt's Point light bears east one and a half miles distant; thence $NE\frac{3}{4}E$ 4 miles, until abreast of Cape Vincent.

From Oswego to Kingston, Ontario.

When one mile north of Oswego light, steer $N\frac{1}{4}W$, passing Pigeon Island light $\frac{3}{4}$ mile to starboard, for $46\frac{1}{2}$ miles, to a point $\frac{3}{4}$ of a mile west from Simcoe Island light; thence NE by N on range for Snake Island light, (red) for $1\frac{1}{4}$ miles, to a point one mile $N\frac{1}{4}W$ of Simcoe Island; thence as directed from Port Dalhousie to Kingston.

From Oswego to Cape Vincent.

When one mile north of Oswego light, steer due north $28\frac{1}{4}$ miles, to a point $3\frac{1}{2}$ miles west from Galoo Island light; thence NN E 16 miles, till Tibbitt's point light bears east $1\frac{1}{2}$ miles distant thence $NE\frac{3}{4}E$ 4 miles, until abreast of Cape Vincent.

N. B.—A good opportunity is afforded masters of vessels to test the working of their compasses, while on their course north of Simcoe Island light, by dropping upon the range of the lights of Pigeon and Simcoe Islands, about two miles to the south of Pigeon Island, and sailing upon the range of the two lights. The true range of the two lights is $N 3^{\circ} W$. The magnetic variation on shore in that vicinity is about $7^{\circ} W$. When sailing upon this range the course, as indicated by the needle, should be either $N 3\frac{1}{8}^{\circ} E$, or $S 3\frac{1}{8}^{\circ} W$.

Magnetic Variations.

Port Dalhousie	$4^{\circ} 22' W$.
Charlotte, Genesee River,	$4^{\circ} 32' W$.
Big Sodus,.....	$6^{\circ} 50' W$.
Salmon River.....	$8^{\circ} 09' W$.
Sackett's Harbor.....	$8^{\circ} 15' W$.
Amherst Island.....	$7^{\circ} 12' W$.
Timber Island.....	$7^{\circ} 19' W$.

Dangers.

The following description of the most important shoals and spits in the way of general navigation from Port Dalhousie to Kingston, and to Cape Vincent, will be of great assistance to the navigator. There are many shoals and spits at the mouth of Niagara River, and in the northeastern end of Lake Ontario. They are accurately located on the U. S. Chart of Lake Ontario as far as the U. S. Survey goes. At Fort Niagara a spit extends for a mile to the NW and to the north. There is a 11 foot shoal $2\frac{1}{2}$ miles NW from Fort Niagara light, and a 13 foot shoal lies 3 miles NW by N from the same point. Other less dangerous shoals exist in this vicinity. From Calf Island, the SW end of Stoney Island, a spit extends SW $1\frac{1}{2}$ miles, with only 10 feet water on it. Charity shoal, with only 5 feet water, bears SE by E 3 miles distant from Pigeon Island light, and SW by W $7\frac{1}{2}$ miles from Tibbitts Point light. Spits extend from Long Point, from Bear Point, and from the western point of Grenadier Island. An extensive shoal, with only 4 feet water on it, lies 2 miles WSW from Snake Island light, and 2 miles NW by $N\frac{1}{2}^{\circ} N$ from Simcoe Island light. Snake Is-

land and Snake Island Light are connected by shoal water. Two 12 feet shoals lie W by S $\frac{1}{2}$ S from Brown Point light, respectively; half a mile S by E from the penitentiary, and half a mile from shore south from the western end of the city of Kingston.

NOTE.—See buoy list for shoals.

ADDITIONAL LIGHTHOUSES ON THE AMERICAN SHORE.

In addition to the list of Lighthouses on pages 14, 15, 16 and 17, are the following on the American shore of Lake Ontario:

Oswego Pier Head Light, near the end of the west pier, at the entrance to Oswego Harbor. Fixed red light visible 10 miles, 22 feet above lake level. Frame tower painted black below and red above; height 15 feet. A breakwater is being constructed outside this harbor.

To enter Oswego Harbor; bring the light on the pier head, to bear SE, and run for it, and when close up to it, say 500 feet, open the harbor and run in S by E $\frac{3}{4}$ E, leaving the Main Light to starboard. The breakwater runs out from the shore to the westward S $5^{\circ}3'$ SW 900 feet, and from this point it runs S $5^{\circ}35'$ W. The finished part of the breakwater is about 2500 feet long, and is 1,000 feet due south from the shore and when completed will be 4,900 feet, and will then bear from the Light on the end of the West Pier head NNW $\frac{1}{4}$ W about 700 feet. The depth of water going in is 18 feet, and the same under that part of the breakwater that is finished.

Fair Haven Lighthouse, near the north end of west pier, at the entrance of Little Sodus Bay. Fixed white light visible 11 $\frac{1}{2}$ miles, 32 feet above lake level. Lake Coast and Harbor Light. Frame tower, painted black below and white above; keeper's dwelling on bluff west of harbor, and painted drab; an elevated walk connects the tower with the shore.

Big Sodus Outer Beacon, on crib at the head of west pier, at the entrance to Big Sodus Bay. Fixed white light, visible 12 miles, 34 feet above lake level, are illuminated entire horizon, harbor light. Frame beacon painted black below and white above.

Big Sodus Inner Beacon, on inner end of west pier. Fixed white light, visible $10\frac{1}{2}$ miles, 24 feet above Lake level, harbor light. Frame beacon painted black below and white above. This light is not visible from the lake, and serves only as a guide to vessels leaving the harbor.

Big Sodus Bay Light, at Sodus Point west side of Sodus Harbor Light. Fixed, varied by white flashes, time between flashes two minutes, visible 15 miles, 63 feet above Lake level. Lake coast and harbor light, dwelling two stories high, with square tower attached, of dark grey limestone; situated on a bluff one mile west of the entrance piers to Big Sodus Bay; bearings Oswego Lighthouse WNW 24 miles. Peter Point Lighthouse (Canada) $N\frac{1}{4}E$, 35 miles.

Genesee River Lighthouse, west side of entrance to the river. A fixed white light visible $15\frac{1}{2}$ miles, 75 feet above lake level. Lake Coast and Harbor light. Octagonal tower, whitewashed, with keeper's dwelling of brick, connected by covered way; situated on bluff on west side of Genesee River on the inside of piers of entrance; bearings Big Sodus Light $E\frac{1}{4}S$ 25 miles.

Genesee Beacon Lighthouse, on the end of the west pier, at the entrance to Genesee River. Fixed white light visible 11 miles, 28 feet above lake level, harbor light; frame beacon painted black below and white above.

Oak Orchard Lighthouse, near north end of west pier, at the entrance to Oak Orchard Creek. Fixed white light visible $11\frac{1}{2}$ miles, 31 feet above lake level, harbor light. Frame beacon painted black below and white above.

Thirty Mile Point Lighthouse, on the bluff called Thirty Mile Point, on Lake Ontario, about 30 miles east of the mouth of Niagara River. White flash light, time between flashes, 1 minute 30 seconds, 71 feet above lake level. Lake coast light, square tower, rising from the north front of the keeper's dwelling, both built of dark grey limestone; dome of lantern painted white, and illuminates entire horizon.

Olcott Lighthouse, near north end of west pier, entrance to Olcott Harbor, Eighteen Mile creek. Fixed white light visible $11\frac{1}{2}$ miles, 32 feet above lake level. Frame beacon painted black below and white above.

Niagara Fort Lighthouse, at the mouth of Niagara River, on the bank of the river above Fort Niagara. Fixed white light visible 16 miles, 78 feet above lake level, limestone tower, and oil room attached, about 65 miles to the westward of Genesee Lighthouse, and E by N $\frac{1}{2}$ N 12 miles from Port Dalhousie, (Canada) entrance of the Welland Canal.

LIGHTS AND LIGHTHOUSES.

On the Canada Side of Lake Ontario from Prescott up to Hamilton and Port Dalhousie.

Windmill Point and Coles shoal, 5 miles above Brockville, are already described.

Grenadier Island Lighthouse, on southwest point of island, north side of channel, 2 miles below Rockport; a fixed white light, visible 10 miles. White square tower 55 feet above river level.

Lindoe Island Lighthouse, on northwest point of island, south side of channel, 5 miles west of Rockport; a fixed white light, visible 7 miles, 40 feet above river level. White square tower.

*Gananoque Narrows Lighthouse, on northeast end of Little Stave Island, south side of channel, 5 miles below Gananoque; a fixed white light, white square wooden tower, 44 feet above river level.

*Jack Straw Shoal Lighthouse, on a pier north side of channel, 3 miles below Gananoque; a fixed white light, white square tower, 31 feet above river level.

*Spectacle Shoal Lighthouse, on pier north side of channel, 2 miles west of Gananoque; a fixed white light, visible 9 miles, white square wooden tower, 28 feet above river level.

*Red Horse Rock Lighthouse, on a pier, southeast side of channel, $\frac{1}{2}$ mile west of No. 92, a fixed white light, white square wooden tower, 28 feet above river level.

* These small lights are for the purpose of marking the channel through the Thousand Islands, between Brockville and Kingston. Variation of Compass, 7° 15' W.

*Burnt Island Lighthouse, on southeast point of Island, north side of channel, $\frac{3}{4}$ of a mile from Spectacle Shoal, a fixed white light, visible 10 miles, white square tower.

*Wolfe Island Lighthouse, northeast entrance, point of island 18 miles southeast of Kingston; a fixed white light, visible 6 miles, white square wooden tower.

Brown's or Knapp's Point, Wolfe Island Lighthouse, Lake Ontario, a fixed white light; visible 10 miles, white square wooden tower, 28 feet above lake level.

Snake Island Lighthouse, on pier on bar, north side of channel, 5 miles west of Kingston; a fixed red light, visible 6 miles, stone square tower, 35 feet above lake level.

Gage or Simcoe, (nine mile Point) Lighthouse, on southwest point of island, 9 miles west of Kingston; a fixed white light, visible 15 miles, round stone tower, white, 45 feet above lake level. In thick foggy weather or snow storm, a fog bell, near the lighthouse, will be sounded four times a minute, and will probably be heard a distance of four miles.

Pigeon Island Lighthouse, 4 miles from the head of Wolfe Island; a white flash light, interval of flash 1 minute and 10 seconds, visible 15 miles, 46 feet above lake level.

False Ducks, (Outer Drake), on the east point of Island, a fixed, white light, visible 22 miles, 68 feet above lake level.

Pleasant Point Lighthouse, entrance to Quinte Bay; a fixed white light, visible $10\frac{1}{2}$ miles, octagonal tower, 52 feet high.

Telegraph Island Lighthouse, Bay of Quinte; a fixed white light, visible 12 miles, white square tower on dwelling, 46 feet above lake level.

Point Peter Lighthouse, on point, white flash light, interval of flash, 1 minute and 40 seconds. Visible 21 miles, circular stone tower, 62 feet above lake level. Variation of compass, 6° West.

Salmon or Wicked Point Lighthouse, on the point, fixed red light, a white square tower on dwelling, 40 feet high.

Scotch Bonnett or Egg Island Lighthouse, on a small island, one mile southwest of Nicholson's Island; a fixed white light, visible 12 miles, stone tower, white, 54 feet above lake level.

Presqu'île, east point, fixed white light, visible 18 miles, 67 feet above lake level. Lighthouse on a hill in shore, bearing from each other WSW and ENE, nearly. Fixed white light, visible 3 miles.

Weller's Bay Range Lights, near west end of the Quinte carrying place. No. 1, fixed red, No. 2 fixed white, on open frame-work towers, painted white. No. 1, 29 feet above lake level; No. 2, 43½ feet above lake level. White above red, to guide vessels through the entrance to Weller's Bay.

Cobourg Lighthouse, on pier head, fixed white light, visible 8 miles, square wooden tower, painted white, 20 feet above lake level. Harbor light not under Marine Department.

Peter Rock or Gull Island, W by S, 4 miles from Cobourg. Fixed white light, visible 10 miles, octagon stone tower, 48 feet above lake level, on a rock off the point.

Port Hope Lighthouse, pier head, east side, a fixed red and white light. Not under Marine Department.

Darlington Pier Head Lighthouse, a fixed white light, on a stone house. Not under Marine Department. Variation of compass, 3° 38' W.

Oshawa Point Pier Head, light fixed white. Not under Marine Department.

Whitby Harbor, light on west pier, fixed white. Not under Marine Department.

Pickering or Liverpool, on east pier head, fixed white. Not under Marine Department.

Gibraltar Point Lighthouse, on the southwest side of the point, 1¾ miles of Toronto City. Is a fixed white light, visible 18 miles, hexagonal stone tower, 66 feet above lake level. A fog bell is placed on this station.

Toronto Lighthouse, on the Queen's wharf, west part; the other on arm of pier. Fixed white light, visible 6 miles, wooden, square red tower, 22 feet above lake level. The red light is on the arm of the pier, to be passed closely on the port hand. This light is not under the Marine Department. Variation of compass, 2° 50'.

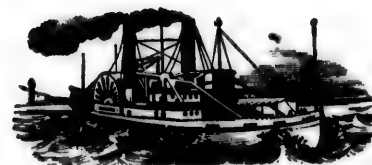
Port Credit Lighthouse, on the east pier, at the entrance of the

river Credit. This light is a fixed white light, visible 10 miles, is 12 miles SW by W from Toronto, and 10 miles from Oakville.

Oakville Lighthouse, on the east pier, at the entrance of the harbor. Fixed white light, visible 12 miles, 42 feet above lake level. Depth of water going in 10 feet.

Burlington Bay Canal Lighthouses, on the south pier of entrance. Fixed white light, visible 15 miles, stone building. Light 60 feet above lake level. Beacon light on the end of south pier.

Dalhousie Harbor Lighthouse, on the end of the east pier. Flashes white, visible 12 miles, on wooden tower, painted white.



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Lake Erie.

BUOYS IN NIAGARA RIVER.

Coming up the Channel between Grand and Strawberry Islands.

Buoy in middle of Chippewa Channel, red iron can buoy No. 2 in 12 feet water. This buoy is about 600 yards to the northward of Grand Island, and near the middle of Chippewa channel. The best water is between these two buoys.

Buoy on Hell's Half Acre, black iron can buoy No. 1, in 13 feet water. This buoy is on the west side of Strawberry Island near the centre. Mouth of French creek S by E $\frac{1}{2}$ E one half mile.

Tonawanda Channel.

Buoy on shoal near Mink Island, red iron can buoy. This buoy is on a shoal a little below or to the northward of Mink Island, and about 300 yards distant, in 9 feet water, and should be left well on the starboard hand in passing.

Buoy on south point of Strawberry Island, red iron can buoy in 12 feet water. This buoy is on a shoal at the south end of Strawberry Island, and should be kept well on the starboard hand in passing.

Buoy on Limekiln Reef, red iron can buoy in 14 feet water; current here 4 miles per hour. The tendency of the current is to set vessels toward the reef, hence the red buoy should be kept nearer aboard than the black. Horseshoe Reef light, S three quarters mile. Fort Erie, SW 600 yards.

Buoy on Bird's Island Reef, black iron can buoy in 12 feet water. This is nearly east of the red buoy on Limekiln Reef and the passage between them leads to the Emerald and Canadian channels; bearings, Black Rock pier head, E by N $\frac{1}{2}$ N, one third mile. Fort Erie W $\frac{1}{2}$ S, one half mile.

Canadian or West Channel.

Buoy on Middle Reef, black iron can buoy in 12 feet water, current $1\frac{2}{3}$ miles per hour. Horseshoe Light, $SE\frac{3}{4}E$, 300 yards. Fort Erie, $NW\frac{1}{2}N$ three fourths mile.

Horseshoe Reef Lighthouse on Horseshoe Reef, at the entrance to the Niagara River. Light fixed, varied by white flashes, visible 12 miles; 43 feet above lake level, arc illuminated, entire horizon. Harbor and river light, an elevated iron beacon, with keeper's dwelling painted white, on masonry pier of protection with ice guard on north and west faces, built upon Horseshoe Reef shoal, forming southern end of middle reef which separates Canadian from Emerald channel. It bears $SEbyS\frac{1}{4}S$ from Fort Erie, and from Buffalo light $WbyN\frac{3}{4}N$.

Buoy on northern end of Middle Reef, red iron can buoy in 12 feet water, current here $1\frac{1}{2}$ miles. The Emerald channel is used in passing from Buffalo harbor into Niagara River; it enters the main channel between black buoy No. 3, and red buoy No. 8.

Buoy on Horseshoe Reef, black iron can buoy. This buoy is on south or seaward end of reef, current 1 mile per hour.

Buffalo Breakwater, north end, on pier of protection, at north end of breakwater in the harbor of Buffalo; fixed red light visible 12 miles. Fog signal bell struck 3 times in quick succession at intervals of 30 seconds. Entrance to the Harbor by the north end of breakwater; Buffalo Main Light $E\frac{1}{2}S$, Horseshoe Reef light, $WbyN\frac{3}{4}N$; Fort Erie Canada $NW\frac{1}{4}W$; Buffalo breakwater south end light fixed red, visible 12 miles.

Buffalo Main Light, near the end of the south pier head, at junction of Buffalo Creek and Lake Erie. Fixed white light, fog bell struck at intervals of 7 seconds. Dunkirk Light $SW\frac{1}{2}S$ distance 40 miles. Long Point Light, Ont., $WbyS\frac{3}{4}S$, distance 64 miles.

To Enter Niagara River.

Leave Horseshoe Reef Lighthouse about 400 yards to starboard, then steer direct for the beacon at Black Rock Pier, leaving red iron can buoys No. 2 and 4 to starboard, and the black iron can buoy No. 1 to port.

To enter the river from Buffalo pier, leave the wooden can buoys No. 2 and 4 on your starboard hand, and the black wooden can buoy to port. The water works crib can be passed on either side, and the draw of the bridge is on the American side. To enter the Tonawanda channel to the eastward of the Strawberry Islands, leave the black spar buoys No. 3 and 5 to port. To enter the Tonawanda channel to the westward of the Strawberry Islands, leave the red spar buoys No. 6 and 8 to starboard and the black spar buoys No. 7 and 9 to port.

There is a strong current setting down this river at Black Rock, at all times, and more especially when the wind is blowing strong from the westward. Boats coming up keep in the eddy on the Canada side, until up to the old red mill, then drop over gradually to the American side, and run up along the dam until up the bend, then sheer off again and take the center of the river.

To Enter Buffalo Harbor.

From Point Abino steer E by N $\frac{3}{4}$ N, 11 miles direct for Buffalo lighthouse, leaving Horseshoe reef and lighthouse to port, and the breakwater to starboard about 150 yards; clear the north end of the breakwater, open the harbor and run in; depth of water going in from 14 to 14 $\frac{1}{2}$ feet.

COURSES AND DISTANCES ON LAKE ERIE.

On Both Shores.

	Courses.	Miles.
From Buffalo to Point Pelee.....	W by S $\frac{3}{4}$ S	200
Buffalo to Marble Head.....	SW by W $\frac{3}{4}$ W	218
Buffalo to Cleveland	SW by W $\frac{1}{4}$ W	150
	thence SW $\frac{1}{4}$ W	24
		174
Buffalo to Dunkirk.....	SW $\frac{1}{4}$ S	40
Buffalo to Grand River or Fairport.....	SW by W $\frac{1}{4}$ W	141
Buffalo to Black River.....	SW by W $\frac{1}{2}$ W	207
Buffalo to Middle Island....	WSW	213
Buffalo to Long Point, Ont.....	W by S $\frac{3}{4}$ S	64
Erie to Point Pelee.....	W by S	130

	Courses.	Miles.
Erie to Grand River or Fairport.....	SWbyW $\frac{1}{2}$ W	60
Erie to Black River.....	SWbyW $\frac{3}{4}$ W	129
Erie to Peninsular of Sandusky.....	WbyS $\frac{1}{2}$ S	144
Erie to Middle Island.....	WbyS $\frac{1}{4}$ S	140
Erie to Long Point, Ont.....	N $\frac{1}{4}$ W	28
Erie to Welland Canal or Gravelly Bay.....	NE $\frac{1}{2}$ N	65
Cleveland to Sandusky.....	W $\frac{1}{2}$ N	14
Thence.....	W $\frac{1}{4}$ S	38
Cleveland to Middle Island.....	WbyN	52
Cleveland to Point Pelee Island Lighthouse.....	WNW	55
Cleveland to Rondeau Harbor, Ont.....	NbyW	54
Cleveland to Point Talbot, Ont.....	NbyE	79
Cleveland to Port Stanley, Ont.....	NbyE $\frac{1}{2}$ E	86
Cleveland to Burwell, Ont.....	NEbyN $\frac{1}{2}$ N	92
Cleveland to Long Point, Ont.....	NE $\frac{1}{4}$ E	110
Fairport to Long Point.....	NE Easterly	82
Fairport to Welland Canal.....	NE $\frac{1}{2}$ E Easterly	128
Ashtabula to Long Point, Ont.....	NE $\frac{3}{4}$ N	57
Conneaut to Long Point.....	NNE $\frac{3}{4}$ E	46
Long Point to Grand River, Ont.....	NE $\frac{1}{2}$ E	33
Long Point to Welland Canal or Gravelly Bay NE by E $\frac{1}{2}$ E		47
Long Point to Port Stanley.....	W $\frac{1}{2}$ N	29
Thence.....	WbyN	30
Port Stanley to the Rondeau.....	SW $\frac{1}{4}$ W	43
Buffalo to Point Abino.....	WbyS $\frac{3}{4}$ S	11
Point Abino to Gravelly Bay	WNW	9
Port Dover to Long Point.....	SEbyS $\frac{3}{4}$ S	18
Long Point to Port Burwell.....	W $\frac{1}{4}$ N	29
Thence	WNW $\frac{1}{4}$ N $11\frac{1}{2}$	
Port Burwell to Port Stanley.....	W $\frac{1}{4}$ N	20
Port Burwell to Cat Fish Creek.....		10
Dunkirk Beacon Light, on pier west side of entrance to Dunkirk Harbor. Fixed white light; color of tower black and red, distance visible 12 miles; harbor light on pier of protection at pier head of west pier of entrance to the harbor; channel two hundred feet wide;		

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on west side near beacon, dangerous rocks outcrop, with 8 or 9 feet of water, and on the east (inside) lie the ruins of the old breakwater, with 10 feet of water. A pyramidal wooden day-beacon painted black, surmounted by a round close cage, painted white, is placed on the east side of entrance to harbor; this beacon, in range with the west end of the new breakwater, marks the eastern limit of the channel of entrance.

SAILING DIRECTIONS FOR LAKE ERIE.

From Buffalo to Silver Creek.

SWbyS 17 miles, thence SSW, 9 $\frac{1}{2}$ miles to Silver Creek bearing south. Silver Creek light discontinued, about 6 feet water going in; lighthouse on west pier.

Silver Creek to Dunkirk.

NNW, 1 mile, thence WSW 9 miles. Dunkirk light fixed varied by white flasher, lake coast and harbor light on the point west of the harbor, visible 16 $\frac{1}{2}$ nautical miles, 87 feet above lake level; Erie Harbor Light bears SWbyW distant 42 $\frac{3}{4}$ miles; Port Colborne Light, Ont. N $\frac{3}{4}$ E 27 miles.

From Dunkirk to Erie.

Run out 1 $\frac{1}{4}$ miles north; then steer SW $\frac{3}{4}$ W 43 miles, to north pier, entrance to Erie Harbor. Erie main light, south shore of Lake Erie, marks the approach to eastern entrance to Presqu'ile Bay, and about one mile to the northward and eastward of Erie, Pa., is a fixed white light, 115 feet above lake level, and visible 18 miles; Grand River or Fairport light SW by W $\frac{3}{4}$ W, distance 66 miles.

Presqu'ile Beacon Range No. 1, behind north pier on the north side of entrance to Presqu'ile Bay, fixed white, visible 12 miles, and is 38 feet high, on pier of protection to harbor; channel between piers 340 feet wide; depth of water, 14 feet. Best water on north side, along the line of buoys. The light is obscured from Peninsular Point around by west, to near the line of the north pier. Vessels coming

from the west, intending to make the harbor, will not haul up till this light has been opened, which indicates that Peninsular Point has been cleared.

Presqu'ile Beacon Range No. 2, on the west end of north pier, fixed white; height above lake level, $9\frac{1}{2}$ feet; visible 7 miles; tower painted white.

Presqu'ile Beacon Range No. 3, on east end of north pier; fixed white, visible 8 miles; height above lake level, $9\frac{1}{2}$ feet; tower painted white. This light and the preceding one, form a range for entering the harbor; and their intersection with the range lights on the Peninsular, just north of keeper's dwelling, marks the channel across the inside bar.

Buoys at Entrance of Erie Harbor.

Outer Buoy, Black Spar Buoy, in $13\frac{1}{2}$ feet water. This buoy is nearly on a line with the south pier of entrance to harbor.

To leave Erie Harbor from the City Docks.

Run out until the beacon ranges on the peninsular are in line, stand for them until the beacon and pier lights are in range or line, when steer for them, passing the lights on the port hand, and giving the north pier a berth of 30 feet; thence as above.

NOTE - A new breakwater has been built from the west end of south pier, to the beach; also new north pier. There are two coal docks on the west side of the breakwater, and railroad elevators west of them, with slips to load at.

Peninsular Beacon Range Nos. 1 and 2, on the peninsular NW of north pier, both fixed white lights, on masts painted white and tipped with red; are 162 feet apart, and indicate the channel crossing the inner bar; and thence to the city docks.

Presqu'ile, on north shore of peninsular of Erie Harbor; light fixed, varied by red flashes every minute; visible 14 miles; 57 feet above lake level, 400 feet from lake, and three-fifths of a mile west of the most northern projection of peninsular.

From Erie to Conneaut.

Run out from Erie piers $NE\frac{3}{4}E$ one mile; thence NW one mile; thence WNW 1 mile; thence W $25\frac{1}{2}$ miles, to abreast of Conneaut

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lighthouse one mile south ; harbor light, near the pier head of west pier of entrance to harbor ; fixed white, visible 12 miles ; 33 feet above lake level ; tower painted black below and white above ; depth of water, 7 feet.

From Conneaut to Ashtabula.

Run out north one mile, and steer WSW $13\frac{1}{2}$ miles, to abreast of Ashtabula, bearing south one mile off. Ashtabula light on the present end of the west pier, at the mouth of Ashtabula River ; fixed, varied by flashes ; is 33 feet above lake level and visible 12 miles ; tower painted black below and white above. Depth of water, 12 feet.

From Ashtabula to Grand River or Fairport.

Run out from Ashtabula piers one mile north ; thence WSW 11 miles, to abreast of Madison Dock ; thence SW by $W\frac{3}{4}W$ 15 miles, to abreast of Fairport, bearing south one mile. Lake coast and harbor light, situated on the bluff on the east side of Grand River, one-quarter of a mile from its mouth, is a fixed white light ; stands 100 feet above lake level, visible 17 miles. Cleveland light, SW $\frac{3}{4}W$, distant 28 miles. Beacon light, on the end of east pier, mouth of Grand River, Ohio ; tower painted black below and white above. Depth of water, 12 feet.

From Grand River to Cleveland.

Run out from Grand River pier north $1\frac{1}{2}$ miles ; thence SW by W 11 miles to abreast of Chegrin, bearing south one mile off ; thence SW $\frac{1}{2}W$ 18 miles to Cleveland piers, bearing SE by S one mile off. Light on the hill, east of the entrance to the harbor, lake coast and harbor light ; fixed white, visible 21 miles, and is 154 feet above lake level.

Marble Head lighthouse bears $W\frac{1}{2}N$, distant $53\frac{1}{2}$ miles. Mouth of Detroit River NW by $W\frac{3}{4}W$, distant 84 miles.

Cleveland beacon No. 1, on the end of the west pier, at the entrance to Cleveland Harbor, has a bell in front of beacon, struck at intervals of ten seconds in foggy weather. Fixed, varied by red flashes. Time between flashes, 20 seconds. Forty seven feet above lake level ; tower painted black below and white above.

Cleveland beacon No. 2, near the pier head on east pier, support-

ing two lights, one red and the other white. The white light, 9 feet vertically above the red light, forms range for entering the harbor. Beyond the arc of 180° the naked lights shows dimly, and warns vessels that they are too far in shore. The tower is painted black below and white above. Depth of water, 14 feet.

Bearings of water works crib from Cleveland west pier head, $N79^{\circ} 16'$ west, distance 7171.6 feet, and from the water works on shore, $N32^{\circ} 10'$ west, 6580 feet. The depth of water at the crib, 38 feet. The light is a "Fresnel" of the sixth order, illuminating 360° , or the entire horizon.

From Cleveland to Black River.

Run out from Cleveland pier head NW by N two miles; thence $W\frac{1}{2}N$ 14 miles, to abreast of Black River point; thence W by $S\frac{1}{2}S$ $10\frac{1}{2}$ miles, to abreast of Black River piers, bearing $SSE\frac{1}{2}E$ one and a half miles off lighthouse near the end of the west pier. Fixed white light, visible 13 miles. Forty-five feet above lake level. Tower painted black below and white above. Depth of water going in, 12 feet.

From Black River to Vermillion.

Run out from the pier head $NNW\frac{1}{2}W$ $1\frac{1}{4}$ miles; thence W by $S\frac{3}{4}S$ $10\frac{1}{2}$ miles to abreast of Vermillion piers, bearing south $1\frac{1}{2}$ miles off. Lighthouse on the west pier head; fixed white; 32 feet above lake level; visible 11 miles; stands on pier of protection behind west end; tower painted black below and red above. Depth of water going in, 9 to 10 feet.

From Vermillion to Huron.

Run out from Vermillion north $1\frac{1}{2}$ miles; thence W by S 10 miles, to abreast of Huron piers, bearing SW by $S\frac{1}{2}S$ two miles off. Harbor light on west pier stands on pier of protection, behind west pier head; cast iron tower, painted black below and red above; fixed white light, visible $12\frac{1}{2}$ miles, and is 40 feet above lake level. Depth of water going in, 12 feet.

From Huron to Entrance of Sandusky Bay.

Run out from the pier head NNE one mile; thence $NW\frac{1}{2}N$ 10 miles, to abreast of the lights in range $1\frac{1}{4}$ miles off. Cedar Point

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light on east side of entrance to Sandusky Bay; fixed white, visible 12 miles; 38 feet above lake level; on top of keeper's dwelling.

Cedar Point Range Beacon light. A fixed red light on keeper's dwelling. Frame dwelling, painted white; the outer face paneled to traverse the light at pleasure. Stands in 5 feet water on an insulated shoal, and is surrounded by pier of protection. Forms a range N30°E with Cedar Point light, for crossing outer bar. Visible 10½ miles, and 26 feet above lake level.

Inside ranges. There are three square cribs, lying in a triangular form, with white lights on masts about 20 feet high, as ranges for the inner bar and channel to the city, No. 1, 2, and 3.

To enter the harbor from outside, run in on the outside range of Cedar Point and red beacon, until well up to the beacon, and abreast the large red can buoy on your starboard hand, until you range the two first cribs lights No. 1 and 2; run on this range until well up to the first crib, No. 1. Then haul sharply round and range crib lights No. 1 and 3; this range runs you to the city. Crib No. 3 lies to the northward of No. 1, and No. 1 and 2 are nearly in line with south side of Ball Island; depth of water going in from 11 to 12 feet.

Buoys in Sandusky River at the Head of Sandusky Bay.

Near the mouth of Sandusky River, black spar buoy in 8 feet water; Musquash point due east 6 miles, Cedar Point beacon E½N 13 miles. This buoy is off the east end of Eagle Island, to mark the entrance to Sandusky River, which passes through a flat marshy region, and is navigable only for vessels of light draught. Note.—Sandusky River is marked with ten small stakes, alternate red and black, black to port and red to starboard going up.

From Sandusky Bay to Marble Head

Run out of the Bay on the opposite ranges, and when over the outer bar and clear of the outer red stake, haul up NNW ¾ miles till Marble Head Light bears SSW ½ mile off. There are good docks here where vessels load stone; Marble Head Light, fixed white, visible 14 miles, 60 feet above lake level, stands on the peninsular north side of Sandusky Bay.

From Marble Head Light.

To Kelley's dock on the south side of Kelley's Island, $N\frac{3}{4}W$ $4\frac{3}{4}$ miles. There are good stone docks on this side of the Island, to the west of Kelley's dock; also good anchorage south of the dock in $4\frac{1}{2}$ fathom water; protection from NE to NW winds.

From Kelley's Dock to Toledo.

Run out from the dock 100 yards, and steer west $2\frac{1}{2}$ miles. Thence NW by $W\frac{3}{4}W$ $22\frac{1}{4}$ miles to abreast of West Sister Island Lighthouse, bearing north, distant $\frac{1}{2}$ mile. Thence $W\frac{3}{4}N$ 15 miles to a point bearing SW by S from Turtle Island Lighthouse $1\frac{1}{4}$ miles.

West Sister Island Light.

On the west end of the Island, is a fixed white light visible $13\frac{1}{2}$ miles, 51 feet above lake level, 12 miles east of Maumee Bay. From the point above mentioned 15 miles from West Sister, then steer $SW\frac{1}{2}S$ $1\frac{3}{4}$ miles to the middle of the channel leading into Maumee Bay. Turtle Island Light at the entrance to Maumee Bay, is a fixed white light visible $13\frac{1}{2}$ miles, 51 feet above lake level, 9 miles from Toledo and 18 miles from the mouth of Detroit River, NE by N.

From Marble Head to Strontian or Green Island.

Is $10\frac{1}{2}$ miles $NW\frac{3}{4}W$, bearing north $\frac{1}{2}$ a mile. Light on the west end of Green Island, fixed, varied by white flashes; mouth of Detroit River NW by N, northerly 33 miles, visible 14 miles and is 57 feet above lake level.

Buoys Entering Portage River.

No. 2 Outer Buoy, red spar buoy in 6 feet water. Port Clinton Lighthouse, bearing $SW\frac{1}{2}W$, $1\frac{1}{4}$ miles.

No. 4 Channel Buoy, red spar buoy in 6 feet water.

No. 6 Channel Buoy, red spar buoy in 6 feet water.

To enter the channel, find outer buoy No. 2 about one mile north of lighthouse, and nearly abreast of a small cluster of willows on the beach. Thence parallel with beach to buoys No. 4, 6 and 8, into the river. The general depth of water in the channel is 6 feet, and the width about 50 yards.

Port Clinton Lighthouse, south side of Portage River, and passed on the port hand in entering. Light discontinued; bearings Green Island Lighthouse NNE 10 miles, Moor's Point NE $\frac{1}{2}$ N, 6 miles.

No. 8 Channel Buoy, red spar buoy in 6 feet water, near entrance of river.

Niagara Shoal.

Niagara Reef, black iron can buoy in 9 feet water. This reef is a dangerous reef of rocks, between West Sister and Green Island, near the track of vessels passing east and west, and should be passed to the northward; bearings, Green Island Lighthouse, E by S, 6 miles, Port Clinton Lighthouse, S by E, 11 miles.

Maumee Range Lights.

Outer Range Front } West side Maumee River.
Outer Range Rear } Fixed white lights.

Middle Range Front } West side Maumee River $1\frac{1}{2}$ miles below
Middle Range Rear } former lights. Fixed red lights.

Inner Range Front } East side Maumee River, 2 miles south of
Inner Range Rear } Middle Range. Fixed red lights.

Range Lights.

Two lights to each range; frame structures. The front ones 1,000 feet in advance of the rear ones, traversed on short railways. These ranges mark the channel from the Bay into Maumee River. Care must be taken not to mistake the middle range, both lights of which are *red*, for the outer ranges. Rear towers are painted white, the front towers have the lower parts painted white, upper red. These lights are visible from 10 to 11 miles.

To enter Maumee Bay and to Toledo.

When Turtle Island lighthouse bears east, distance a quarter and one-eighth of a mile, steer S $\frac{1}{2}$ W $1\frac{1}{2}$ miles to red iron can buoy No. 8; thence SW by W one mile, and find red spar buoy No. 4; thence SW one mile, and find black iron can buoy No. 11; thence follow black spar buoys around the elbow, and find red spar buoy No. 28 near mouth of river.

To run the Channel at Night.

When abreast of and due west of Turtle Island Light, steer $S\frac{1}{2}W$ until the Outer Range lights (both white) are in line, when steer for them until the Middle Range lights (both red) are in line: run on that line until the Inner Range lights (both white) are in line, when steer for them, passing Grassy and Presqu'ile Point and into the river. Depth of water going in $11\frac{3}{4}$ to 14 feet.

When into the river keep the port side well aboard, until above the middle ground, which lies off the Manhattan docks, and some little distance above, leaving red buoy to starboard and black buoys to port; haul over to the Toledo side and run up to bridge, etc.

To Run the East Channel into Maumee Bay.

Make the outer buoy, a black spar buoy with fly No. 1. Turtle Island Lighthouse bearing $WbyN\frac{1}{2}N$, $2\frac{1}{4}$ miles distant; pass the buoy on your port hand 150 feet off, also the black spar buoys No. 3 and 5, about the same distance on the port hand; thence steer WSW, 4 miles to the black iron can buoy No. 1; thence as above.

HEAD OF LAKE ERIE.**From Bois Blanc Lighthouse to Cleveland.**

Run out 4 miles $S\frac{3}{4}W$ from Bois Blanc Lighthouse; thence ESE, $11\frac{1}{2}$ miles to abreast Little's Point, bearing east, $1\frac{1}{4}$ miles; thence SE by $E\frac{3}{4}E$, $73\frac{3}{4}$ miles to Cleveland. Leaving Colchester Reef light ship, red light, one mile to the eastward, and Point Pelee Island Lighthouse, $1\frac{1}{4}$ miles west.

From Detroit River to Point Pelee.

From Bois Blanc Lighthouse, $S\frac{3}{4}W$, 4 miles; thence ESE $11\frac{1}{2}$ miles to Little's Point, bearing east $1\frac{1}{4}$ miles; thence E by $S\frac{1}{2}S$, 23 miles to Point Pelee, distant $\frac{3}{4}$ mile north.

From Detroit River to Sandusky.

From Bois Blanc Lighthouse, $S\frac{3}{4}W$ $4\frac{1}{2}$ miles; thence SE by $S\frac{1}{2}S$ to abreast of Strontian or Green Island Lighthouse, 33 miles,

$\frac{1}{4}$ mile off, running $\frac{1}{4}$ of a mile east of Middle Sister Island, and a quarter of a mile east of Strontion Island, to a point $\frac{1}{3}$ mile south of South Bass Island; thence $SE\frac{1}{4}E$ 9 miles, to abreast of Marble Head Lighthouse; thence SSE, 3 miles to entrance to Sandusky Bay.

In case of heavy weather from the westward, when abreast of the light ship at Bar Point, steer $SE\frac{1}{4}S$, $37\frac{1}{2}$ miles, passing within $\frac{1}{4}$ mile of East Sister Island, and $\frac{1}{4}$ mile of the NE point of Kelley's Island; thence $S\frac{1}{2}W$, $8\frac{1}{2}$ miles to entrance of Sandusky Bay. On this route you leave the Hen and Chickens Island to port $\frac{1}{2}$ mile. North Bass and Middle Bass Islands to starboard. Middle Island light and Little Gull Island to port; Middle Island can be passed close to on either side. There is a small shoal with 9 feet water, $ENE\frac{1}{4}N$, $\frac{7}{8}$ of a mile from the lighthouse; and two small shoals, one NE from north point of Kelley's Island $\frac{7}{8}$ of a mile with 8 feet water, and the other $NE\frac{3}{4}E$, $1\frac{3}{4}$ miles from the same, with 6 to 10 feet water on it; rocky.

From Detroit River to Put-in-Bay.

From Bois Blanc Lighthouse, $S\frac{3}{4}W$, $4\frac{1}{2}$ miles to abreast of Light ship at Bar Point; thence $SE\frac{7}{8}S$, 29 miles to Put-in-Bay, leaving Middle Sister Island one mile to starboard; also Snake Island to starboard half a mile, and the Bass Islands to port. To run in when up to St. Helena, a small island with a tower on top, haul close round it and into the Bay, and come to anchor in $3\frac{1}{2}$ fathoms or run to the docks on the east side of the Bay.

Detroit River to Maumee Bay.

From Bois Blanc Lighthouse steer $S\frac{3}{4}W$, $5\frac{1}{2}$ miles; thence SWbyS for 23 miles; thence $SW\frac{1}{4}W$, $1\frac{1}{2}$ miles to west channel.

Detroit River to Monroe.

From Bois Blanc Lighthouse steer $S\frac{3}{4}W$, $5\frac{1}{2}$ miles; thence SW byS 3 miles; thence $SW\frac{1}{2}W$, 10 miles to Monroe piers, passing within $\frac{1}{4}$ mile of Stony Point.

Monroe to Point Pelee.

East $42\frac{1}{2}$ miles, passing 2 miles north of Middle Sister Island.

Monroe to Cleveland.

(Middle passage) E by S $\frac{3}{4}$ S, 36 $\frac{1}{2}$ miles, passing $\frac{1}{2}$ mile north of North Bass Island, and between Middle Island and Point Pelee Island; thence E by S 53 miles to Cleveland.

Monroe to Sandusky.

SE by E 40 miles, to abreast of Marble Head Lighthouse; thence SSE 3 miles to entrance to Sandusky Bay.

Maumee Bay to Sandusky.

From West channel NE $\frac{1}{4}$ N, 1 $\frac{1}{2}$ miles; thence E $\frac{3}{4}$ S 14 miles, to half a mile south of West Sister Island Lighthouse; thence SE by E $\frac{3}{4}$ E to a point $\frac{1}{3}$ of a mile south of South Bass Island; thence as above described to entrance to Sandusky Bay.

NORTH SHORE OF LAKE ERIE.**Buffalo to Point Abino.**

W by S $\frac{3}{4}$ S 11 miles. A good lee can be made under this point from SW to West winds. Vessels generally do not run far enough into and up the Bay to lie easy.

Point Abino to Port Colborne.

Entrance to the Welland Canal WNW 9 miles, main and range lights on the west pier, 58 and 14 feet high; fixed white lights. This harbor is under improvement by the extension of the west pier and blasting rock from the bottom of the channel, next to the west pier. Black buoys indicate the deep water going in, on the port hand. A large dummy has also been built at the outer end of the channel, on the starboard side, going in. Sugar Loaf Hill, 2 miles west of Port Colborne, is a good mark for vessels coming down the lake.

Mohawk Island, 25 miles to the westward from Port Colborne, and 2 $\frac{1}{2}$ miles from Grand River or Port Maitland, has a lighthouse 64 feet high, and flashes white every 3 minutes, and is one mile south of the main land. Visible 16 miles—is a good coast light.

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A good harbor can be made under the lee of this island from SW winds, by bringing the light to bear west. Vessels can lie here in the heaviest gales. The reef sets off from the island SE $2\frac{1}{2}$ miles, which forms the lee. The bottom is red clay. Come to in $3\frac{1}{4}$ fathoms water.

To run through bound down, keep midway between Mohawk Bluff and the Island, until you drop into 14 feet water, then haul up to the northward and eastward and follow the island round in 12 to 13 feet water, pretty close to; and when past the island, run out to the eastward, giving Point Selkirk a berth of half a mile, and come to under the island, with the lighthouse bearing west. To come to an anchor from the eastward, bring the island to bear west, and let go in three and a half fathoms as before.

Grand River or Port Maitland, $2\frac{1}{2}$ miles from Mohawk Island. Light on the west pier; fixed white. This is a good harbor. In running in, keep the west pier well aboard, and follow up the pier work until into the river. To come to anchor, run well up past the entrance to the canal on the starboard side, and come to in three fathoms water or run into the canal. This branch of the Welland Canal goes into the feeder which is at Dunnville, five miles above, where there is a dam, and the town of Dunnville. This river is navigable as far as Cayuga, thence by locks and dams to Brantford, 50 miles in all.

From Grand River to Port Dover Thirty-two Miles.

Run out from Grand River piers SW $\frac{1}{2}$ S 4 miles, thence WSW 6 miles, to abreast of the shoal that lies to the westward of Grand River Bluff 3 miles, and 3 miles from the shore. This shoal is three miles long, and in a WSW direction, nearly in range with the shore. Thence W $\frac{1}{4}$ S 22 miles to Port Dover Lighthouse, bearing NW $1\frac{1}{2}$ miles, then run for the piers, range them, and run in, keeping the west pier best aboard. The light is fixed white, 20 feet above lake level, depth of water 10 to 11 feet; visible 10 miles.

From Port Dover to Long Point, SE by S $3\frac{1}{4}$ S 18 miles. Long Point light is on the east extremity of the point, flashes white every minute, and can be seen 25 miles in clear weather, 65 feet high from lake level. This light is a good leading mark up or down the lake;

good holding ground under the point between the lighthouse and Big Bluff, bearing from the point to anchorage NW, in 5 fathoms water. Sandy clay bottom. The deepest water in Lake Erie lies SE from the lighthouse, 8 miles off, 204 feet deep, and south from the same, 5 miles off, 182 feet deep. Vessels come to anchor under the point, on the west side near the centre of the point, in 5 fathoms water, with a northeast wind. The bottom is sandy.

From Long Point to Port Burwell.

Long Point to Port Burwell $W\frac{1}{4}N$ 29 miles, thence $WNW\frac{3}{4}N$ 12 miles. Port Burwell light is on the hill on the east side of the creek, 333 yards from the beach. Fixed white, can be seen 12 miles, and is 96 feet above lake level. A red light on the west pier end, channel narrow, depth of water 10 to 12 feet.

Port Burwell to Cat Fish or Port Bruce $W\frac{1}{4}N$ 10 miles. White light on a pole. No government light.

Port Burwell to Port Stanley, $W\frac{1}{4}N$ 20 miles. Light, fixed white, visible 9 miles, on the west pier. The entrance to this harbor is narrow; the piers run out straight, depth of water 9 to 10 feet.

From Port Stanley to the Rondeau, $SW\frac{1}{4}W$, 43 miles; good holding ground under the east side of Rondeau in 5 to 6 fathoms. There is 14 feet water going into the Rondeau piers, on the west side. Vessels often come to an anchor with a NE wind, but the holding ground is sandy. No harbor for large vessels.

From the Rondeau to Point Pelee.

$SW\frac{3}{4}W$ 44 miles. Run on this course 4 miles further, until Point Pelee Island Lighthouse bears $W\frac{1}{2}N$, and Point Pelee $NNE\frac{3}{4}E$; thence $NWbyW\frac{3}{4}W$ 34 miles, to the entrance of Detroit River, with Bois Blanc Island Lighthouse bearing $N\frac{3}{4}E$ $4\frac{1}{2}$ miles. On this route you leave the middle ground to starboard. The bottom off Pelee Point is sandy; and along the east side of the island and round the lighthouse point leading into McCormick Bay is rocky, with boulders for $\frac{3}{4}$ of a mile out and off the point. The light is a fixed white light, and can be seen 9 miles. $WbyN$ clears Pelee shoal. Good anchorage in McCormick's Bay, in 5 fathoms.

Point Pelee Spit Caisson.

Light on Caisson or Dummy, $2\frac{1}{2}$ miles south from the extreme end of Point Pelee, north shore. Flashes white, height from water level 76 feet, and can be seen in clear weather 20 miles. Vessels and tugs with rafts, etc., lie to anchor in the bight, on the west side, close in to the point, with NE to east winds, in 5 to 6 fathoms. Mud and sand bottom.

Middle Island.

Between Pelee and Kelley's Island. A fixed red light, visible 10 miles. There is good water on either side of the island. Chicaloney's Shoal, lays off the south end of Point Pelee Island, and well clear of the extreme end of the same; it bears from Middle Island $NE\frac{1}{2}E$ $3\frac{1}{2}$ miles, and is $1\frac{3}{4}$ miles east from Pelee Island. This shoal is one of the best bass fishing places around these islands.

Bar Point Light Ship.

Lights, 1 fixed red, 1 fixed white, one above the other. Ship red, with Bar Point Light Ship painted on each side. Is anchored in 18 feet water, 50 fathoms to the southward of the west end of reef, and distant from Amherstburg light $5\frac{1}{2}$ miles, bearing nearly due south; and from Bar Point $S\frac{1}{4}W$ 3 miles. Vessels passing should not go within half a mile of Light Ship, and vessels of heavy draught, should pass to the southward. A bell will be rung during thick and foggy weather.

Detroit River.

To run up Detroit River by the Canada Channel to Windmill Point on Lake St. Clair. From the Light Ship, as described above, run for Beaubilo Island Lighthouse, bearing $N\frac{3}{4}E$, leaving two red barrel buoys off Bar Point on your starboard hand, keep the light a little on your port bow, until within one mile from it, leaving a red buoy pretty close in to the main shore to starboard; then steer for the centre of the channel between Beaubilo Island and the main land, leaving a black buoy to port, off the end of the shoal that makes down from the island, $\frac{3}{4}$ mile. When abreast the lighthouse haul off towards the docks at Amherstburg, and take the middle of the river up to the head of Beaubilo Island, leaving a red buoy on the bank

shoal, just above the town, and range the two lights on the island. The ranges are thus, on the NE point of the island. No. 1, a fixed white light; No. 2, stands back from No. 1 450 feet, SW $\frac{1}{2}$ W, and is a red light.

Bois Blanc Island light is on the south point of the island; is a fixed white light, visible 18 miles, and stands 56 feet above the level of the river. When the lights are in range, run until well over to the Canada Southern Railroad dock, and follow the shore along, until you get up to the red buoy on a rock, 375 feet from the shore, and directly opposite the gate of McDougal's mansion, a large brick building; then run across and up river NNW, leaving the Fisheries and the Alexander House, on Grosse Isle, pretty close to, until you range Mamajuda light with Grassey Island light, leaving a red buoy on the starboard hand off the SW point of Fighting Island; thence due north on the range, leaving both lighthouses and crib work about 200 yards off. Keep on the course until past the buoy on the SW corner of Fighting Island, then proceed up river. Keep either side of the river aboard, but time can be gained by hauling gradually over to the Canada shore, and run up in the eddy close to. Mamajuda light is a fixed white light, visible 11 miles, and is 33 feet above river level, on the keeper's dwelling, painted white. It stands on pile work. Grassey Island light the same as Mamajuda. Crossing Sandwich Bay from point to point, thence up the river on the Canada side or over to Detroit. To run up on the Canada side keep that shore aboard until up to the head of Belle or Hog Island, (leaving a buoy on your port hand on the shoal which makes down from Hog Island, and is painted with black and red horizontal stripes), pass the Fishery on the NE point of the island, and haul up for the ranges on Gross Point, a little below Windmill Point Lighthouse. On this range you leave a red buoy to starboard on the shoal which runs down from Peach Island, and a buoy with red and black horizontal stripes, to port, on a shoal off the NE end of Hog Island. This buoy is on the eastern end of the shoal, and marks the entrance to either channel. When about half way on the range from the red buoy on the starboard hand, and the striped buoy to port, haul up river and run out ENE 3 miles past Windmill Point Lighthouse and into Lake St. Clair. A perpendicular white

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and black striped buoy will be placed this season at the turning point, to be left on either hand, and will indicate the entrance to Detroit River. The depth of water all through Detroit River is from 3½ to 5 and 6 fathoms, except at the Lime Kiln Crossing, where it is 15 feet.

Windmill Point Lighthouse is on the west side of Detroit River, and entrance to Lake St. Clair; it is a fixed white light, varied by red flashes, visible 13 miles, stands 55 feet above lake level.

River Thames Lighthouse, Lake St. Clair, Ont., at mouth of river, south shore; fixed white light, visible 12 miles, square wooden tower, 34 feet high. Small light, on round stone tower, visible 6 miles. The two lights in one lead over the bar. Range S 26° E, and N 26° W, 450 yards apart.

Course from Windmill Point Lighthouse, after clearing the river to river Thames Lighthouse, E by S 25 miles.

Monroe Lighthouse on north pier at the entrance to River Raisin, Mich. Fixed white light, visible 12½ miles, 42 feet above lake level. A harbor light; frame tower, painted white, with keeper's dwelling attached. Bearings, Stony Point NE½E, 4½ miles, Turtle Island Lighthouse, S by W½W 10 miles.

Buoys Entering Gibraltar or West Channel of Detroit River.

Outer buoy No. 2, red spar buoy. This buoy is located about 440 yards to the southward of the shoal running out from Celeron Island, in 13 feet water.

Inner buoy, No. 4, red spar buoy, in 11 feet water. This buoy is on the southern extremity of a narrow shoal.

There are three more red buoys, first in 10 feet and the others in 12 feet water.

Buoys Above Gibraltar.

Red spar buoy, in 10 feet water. This buoy is on the end of a shoal, and the channel is nearly north from it, 800 yards from lighthouse. Red spar buoy in 12 feet water. This buoy is on the north end of Mamajuda shoal, and opposite the town of Wyandotte.

To Enter Detroit River by the American Channel, from the Light Ship.

From the Light Ship to Bar Point, steer NW by N $5\frac{1}{4}$ miles, or until you make the first red buoy; follow up the buoys leaving red to starboard, until into the river; when abreast the lighthouse, which is in the town of Gibraltar, 800 feet from the river—the light is a fixed white light, visible 13 miles, and 47 feet above river level—run up river leaving a small island on your starboard hand, then keep Grosse Isle side best aboard, and run for the draw of the bridge across the river from Trenton to Grosse Isle.

The American Channel Railroad Lights.

On the bridge, fixed red or green. Three lights, in lanterns, to mark the draw in the railroad bridge across the river. When the draw is closed, three red lights, arranged in the form of a triangle, will show to vessels. The highest middle light will be immediately over the pivot of the draw, at an elevation of 28 feet above the level of the top girders; and the other lights will be placed at the summit of the side frames, at each end of the bridge, next the draw span. When the draw is open, three green lights will be displayed as above. When through the bridge keep the starboard side of the river best aboard for one mile, to clear a small shoal $\frac{3}{4}$ mile above Trenton docks, then keep mid-channel until near up to Wyandotte, where there is good water alongside the docks—14 feet. From Wyandotte keep the port side of the river aboard all the way up to Detroit, leaving Mud Island opposite the River Ecorse to starboard (30 to 34 feet water all through) passing the River Rouge, $4\frac{1}{2}$ miles from the River Ecorse, Fort Wayne, the Copper docks and Clark's dry docks, all of which docks have plenty of water alongside. In passing from Clark's dock, keep the river docks close aboard, and run up, leaving the middle ground off the Michigan Central Elevator, to starboard, 7 feet water). From Detroit to the American channel, run up along the city docks till you make the buoys off Hog Island. A buoy will be placed on this middle ground this spring

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To Run the Channel Between Grosse Isle and Mamajuda Island.

From the dock at the Alexander House, on the east side of Grosse Isle, run up along shore, and follow up the grassy point that makes up from the north end of the island, steering about north, leaving Mamajuda Island and the grassy flat, which makes from it on your starboard hand, until up to the stake on the end of the shoal, which makes up from the head of Grosse Isle; leave this stake to port, and haul over to Wyandotte, or run up river. Depth of water in this channel 36 feet, is plain to be seen in daylight, especially when the rushes are up. The channel between Mud Island and Grassey Island is generally staked out, has 36 feet water in it, and lies NE and SW.

Fighting Island Channel.

To run up Detroit River through Fighting Island Channel. When abreast the Canada Southern Railroad dock, follow the Canada shore along until you just open the mouth of Detroit River, between Bois Blanc Island and the main land. This is the mark for entering the channel. It is 3 miles from the railroad ferry dock, and the course is N $\frac{1}{2}$ W. Depth of water 30 feet. Follow the island along all the way through, port side best aboard, leaving Turkey Island and another swampy island $\frac{3}{4}$ mile long, on your starboard hand; and when up near the head of the island, haul off gradually to port, and run out NW into main river, leaving Turkey Creek Shoal to starboard. When Fighting Island bears south, steer up river.



Lake St. Clair and River.

From Windmill Point Lighthouse to Fort Gratiot and Lake Huron.

From Windmill Point Lighthouse to New Baltimore. Run out from the head of Detroit River in Lake St. Clair, ENE 3 miles; thence NNE 18 miles to Point Huron stake which leave to port; thence N by E to New Baltimore right ahead. Clinton River Lighthouse bears from the entrance of the old north channel SW by W $\frac{1}{2}$ W; light discontinued, 6 feet water in river.

From Windmill Point Lighthouse to the Old Cut at the Entrance to the South pass, into St. Clair River.

Run out from the head of Detroit River ENE, until the two first points are open, north of the lighthouse, or about $2\frac{1}{2}$ miles; thence NE $\frac{1}{2}$ N 20 miles, till in 15 feet water, with the lights in range, bearing NE by E, distance between the two lights 1,000 feet. Upper light fixed white, visible 13 miles, and 44 feet above lake level. Lower light, beacon, fixed white, visible 11 miles, 28 feet above lake level. Run on the range leaving black buoys to port and red to starboard, and when close up to the beacon light haul off to the SE, leaving buoys as above until into the river.

From Windmill Point Lighthouse to entrance of Ship Canal through Flats.

Run out from the head of Detroit River E by N $\frac{1}{2}$ N 3 miles, or to the turning buoy, painted with perpendicular white and black stripes, (this buoy is to be placed as a leading mark for the river this season;) and will be in 16 feet water; thence NE $\frac{1}{4}$ N 18 miles, with the two lights, (red) on each end of the port pier. Both these lights are fixed red lights, and mark the passage each way, visible 13 miles, 45 feet above lake level; thence run up river in mid-channel for 7 miles to the buoy on the starboard hand, painted red, on the edge of the Flat setting off the

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west side of Squirrel Island, head of Bassets channel, bearing S by W $\frac{1}{2}$ W, three quarters of a mile. The strait of St. Clair, connecting Lakes Huron and St. Clair, are 38 miles in length; its general directions are north south; thence up river keeping mid-channel up to the head of Russel or Herson Island, where there is a red and black horizontal striped buoy. To run over to Algonac, leave this buoy 100 yards to port, good water at all the docks. From either side of the river you may keep along shore or take the center, as there is good water on each side. From the head of Russel Island to Marine City 8 miles, as you approach Marine City you make Woodtick Island; a shoal sets down from this island, 600 yards, and has a red and black horizontal striped buoy on the south end of it, which indicates a channel on both sides of the island; there is also another buoy of the same kind on the shoal off the north end of the Island, the widest channel is on the American side. From Marine City to St. Clair City, 8 miles, keep the port side well aboard or run from point to point; vessels bound through generally run the Canada side up to Sarnia, to run up on the St. Clair side; keep the port side aboard after passing the point on the Canada side and run up close along the docks. The middle ground opposite St. Clair City is 2,000 yards long north and south, and 230 yards wide, and has two buoys on it, one at the north and one at the south end, with black and red horizontal stripes, which indicate a channel on both sides of it; breadth of channel on St. Clair side between the middle ground and St. Clair City, 460 yards. Canada side to Sutherland's dock 800 yards. From St. Clair City to Port Huron 12 miles. To run up keep either side of the river aboard. On the Canada side you leave Stag Island to port, and on the American side you leave it to starboard; a shoal extends down from the south end of Stag Island one mile, and has a black and red horizontal striped buoy on it, indicating the channel on either side of the island; another buoy, with red horizontal stripes is on the north end of a shoal, 500 yards N by W $\frac{1}{2}$ W from the north end of the island; width of the Canada channel 500 yards. From the head of Stag Island, the shores are bold as far as Sarnia on the Canada side, and up to Lake Huron on the American. From Sarnia to head of rapids, run for the low sandy point on the starboard hand, and run up just in the eddy, past the railroad docks and out to Lake Huron.

Lake Huron.

Fort Gratiot at the head of St. Clair River, Michigan.

Light fixed, varied by white flashes. Time between flashes, 2 minutes. Visible 16 miles. Eighty-two feet above lake level. Marks the entrance from Lake Huron into St. Clair River. Has an eight inch steam whistle, giving every minute a blast of 8 seconds, followed by an interval of 52 seconds.

From the head of St. Clair River to Sand Beach Harbor of Refuge.

Run out of the river NNE $2\frac{1}{2}$ miles; thence N by W 57 miles, until well up to the harbor at Sand Beach Bay. Bring the light to bear NW $\frac{3}{4}$ N, and run in on that bearing. The light stands on the angle of the breakwater, at the north end. The light is a fixed white light, visible 13 miles; is 44 feet above the level of the lake. Tower painted white. There are two red lights on masts, at the northern entrance. On the range at a distance of $1\frac{1}{2}$ miles, you leave a buoy on your port hand, in 11 feet water $\frac{1}{4}$ mile from the range line, and $\frac{1}{2}$ mile from the dock at the village of Sand Beach, W by N $\frac{3}{4}$ N; run up alongside the breakwater, or come to anchor well up under the SE part of the breakwater, in $4\frac{1}{2}$ fathoms water. Mud bottom. In running out through the upper passage, which is 350 feet wide, you leave two buoys on your port hand near the upper outlet; run through between the two red lights, one on each end of the piers, and haul up NNE for two or three miles, leaving a buoy on your port hand $\frac{1}{4}$ mile off in 12 feet water; thence along shore at the distance of 1500 feet from piers, $1\frac{1}{2}$ miles, to Point Aux Barques, 15 miles, bearing WSW $3\frac{1}{2}$ miles. Point Aux Barques can be passed at a distance of two miles in safety, with $3\frac{1}{2}$ to 4 fathoms water.

From the Shore line at Sand Beach to the First Red Light on the Pier of Protection,

Is 2300 feet; the channel between the pier heads is 350 feet wide, and the inner angle of the breakwater, to the main light, is 350 feet; the breakwater completed is 1250 feet; the cribs sunk to water line, ready for the superstructure, 850 feet; and the whole length of the breakwater when completed will be 4100 feet. The dock at the village of Sand Beach runs out E $\frac{1}{2}$ N 900 feet, and has an angle pier running SE $\frac{1}{2}$ E 300 feet. Also another extension of pier from the same point E by S 200 feet, so that a vessel can lie with her bow in the angle of the two last named piers. Depth of water alongside the piers, 14, 15 and 17 feet. The bottom of a wrecked vessel lays 300 feet due east from the end of the long angle of dock. There are three patches of shoal water 800 feet east from the main pier, with 10, 11 and 12 feet water on them; thence to the breakwater 20, 24 and 27 feet water. Distance from corner of Sand Beach village dock to the breakwater, NNE $\frac{1}{2}$ mile. (Centre of finished work.) The points of land to the southward of the bay are rocky. One and a half miles from these points east, the water is 4 $\frac{1}{2}$ to 5 fathoms. Sandy bottom.

Ports Along Shore.

From Gratiot to Burchville.....	12 miles.
From Burchville to Lexington.....	7 miles.
From Lexington to Bark Shanty.....	12 miles.
From Bark Shanty to Cherry Creek.....	5 miles.
From Cherry Creek to Forrestville.....	12 miles.
From Forrestville to Sand Beach.....	15 miles.
From Sand Beach to Port Hope.....	10 miles.
From Port Hope to Point Aux Barques.....	15 miles.
From Port Aux Barques to Huron.....	3 miles.
From Huron to New River.....	3 miles.
From New River to Port Austin.....	7 miles.
From Port Austin to Pinnepog.....	8 miles.
From Pinnepog to Pigeon River.....	11 miles.
From Pigeon River to Saginaw River ..	38 miles.
From Saginaw River to Pine River.....	22 miles.
From Pine River to Tawas.....	26 miles.

From Head of St. Clair River to Saginaw River.

Run out of St. Clair River NNE $2\frac{1}{4}$ miles; thence N by W 60 miles; then follow the coast around at the distance of two miles, till Point Aux Barques and the reef projecting out from it is passed, then steer more to the northward, until the mill chimney at Port Austin bears due south 4 miles off. From thence to pass to the northward of Charity Islands, steer W $\frac{1}{2}$ S $2\frac{1}{2}$ miles, giving the island a good berth of two miles, as there are rocky lumps extending that distance from the lighthouse to the northward. Having passed the island, steer SW by S 33 miles for Saginaw River. Point Aux Barques light, on the shore of Lake Huron, and south side of the entrance to Saginaw Bay. Flashes white; visible $16\frac{1}{2}$ miles; 89 feet above lake level, and marks the turning point for vessels entering Saginaw Bay. Port Austin lighthouse building, on the north end of the reef which extends out three miles from the shore. Charity Island light, at the mouth of Saginaw Bay. Fixed white; visible 13 miles; 45 feet above lake level. This light is on the north point of the island, from which shoals extend from NW to NE. The main channel is to the westward of the light. Strangers should not attempt to pass to the eastward of the light or island except with a good pilot.

Saginaw River Range Lights.

Front light, fixed red, visible 12 miles; rear light, fixed white, visible $14\frac{1}{4}$ miles, at the mouth of the Saginaw River, Michigan.

To enter the cut to the mouth of the Saginaw River. When in three fathoms water, bring the lighthouse to bear S by W. At this point the light should be 3 miles distant, and the north end of the cut half a mile. Stand on this course for the second class iron can buoy, which marks the north end of the cut. This cut is 6,800 feet long, 190 feet wide, and 12 feet deep, ranging N $\frac{1}{2}$ E and S $\frac{1}{2}$ W, and marked by five pair of buoys, red and black, opposite to each other. These pairs of buoys are 1,650 feet apart. On standing through the cut, when you have passed buoys 9 and 10, the mouth of the river will have been entered, the water deepening to 16 and 20 feet; then passing between two pairs of buoys, Nos. 11, 12, 13 and 14, will lead you up river. All the ports along shore from Lexington to Port Hope,

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except Sand Beach, can be made by bringing the piers to bear west, or range them and run alongside. Port Austin has two good docks on the east side of the old harbor, with 11 to 12 feet water.

From Saginaw River to Tawas.

Run out of Saginaw River on opposite courses and ranges until in three fathoms water, then steer NE by N $32\frac{1}{2}$ miles till Charity Island Lighthouse bears SE, distant $3\frac{1}{2}$ miles; thence due north 13 miles to East Tawas. In running up you leave Alabaster and Tawas City to port. They both have good docks to load at, but are open to easterly and southerly winds. Depth of water 12 to 13 feet.

Tawas light is on the SW end of Ottawa Point, on the easterly side of Tawas Bay. Is a fixed white light, varied by red flashes; time between flashes one minute and thirty seconds; visible 15 miles, and is $70\frac{1}{2}$ feet above lake level. A sand flat extends $1\frac{1}{2}$ miles to the southward and westward from the light. The northwesterly edge of of the flat is very abrupt, dropping off from 6 to 24 feet in a vessel's length. A second class can buoy is placed off the SW end of the flat. Vessels coming from the northward and eastward will keep the buoy open on the starboard bow about a point; when abreast the buoy, haul up for the anchorage; nothing to the eastward of N by E, with the light on the point bearing from E to SE. The soundings, after passing the buoy, are from $3\frac{1}{2}$ to 5 fathoms. Sand and clay. Tawas City bears NW by W $\frac{1}{2}$ W 3 miles. Ottawa Point or Tawas Light bears from buoy NE $\frac{1}{4}$ E, $1\frac{1}{8}$ miles. From Point Au Barques, bearing WSW 4 miles, to Tawas City WNW $\frac{1}{4}$ W 39 miles, with the light bearing NE $\frac{3}{4}$ E 2 miles; thence leave the buoy 300 yards to starboard and run in WNW $\frac{1}{4}$ N for Tawas City. A good light is kept on the pier at Tawas City, and also at East Tawas. The light stands on the corner of the pier, and when clear of the buoy off Ottawa Point Shoal, haul up for the light, or steer NW by N $23\frac{1}{4}$ miles. In the night the street lights make a very good range to run in by, 10 to 14 feet water along side the dock. This pier is docked quite a long way to the northward of the corner, where vessels load lumber. From Tawas City to Alabaster, $4\frac{3}{4}$ miles south, has a good pier, with 12 to 14 feet water, where vessels load plaster.

From Point Au Barques Light.

Bearing WSW 4 miles to Sauble River Lighthouse, NW $\frac{1}{4}$ W $38\frac{1}{4}$ miles. The lighthouse is on the end of the north pier, is fixed red, visible $11\frac{1}{2}$ miles, stands 33 feet above lake level, tower painted white; depth of water going in, 10 to 11 feet; best water on north side. The principal freight dock is to the southward of the harbor, 14 feet water. There are three or four mill piers to the north of the harbor, with 11 to 14 feet water.

From Point Au Barques to Sturgeon Point Lighthouse and Harrisville.

With Point Au Barques light bearing WSW 4 miles, steer NWby N $49\frac{3}{4}$ miles, to Harrisville piers; thence run out from the piers $1\frac{1}{2}$ miles, and steer NbyE 4 miles, to abreast of Sturgeon Point Lighthouse. This light is a coast light, on the western shore of Lake Huron, 24 miles south of Thunder Bay Island; is a fixed white light, visible 15 miles, 69 feet above lake level, and is a white tower. From this point to Thunder Bay Island light, bearing west 2 miles, steer NbyE $22\frac{1}{2}$ miles.

From Point Au Barques.

Bearing west 5 miles to Thunder Bay River, Alpena NNW 65 miles; thence with the south point of Thunder Bay, bearing west 5 miles, steer WNW $\frac{1}{2}$ N $16\frac{1}{2}$ miles to Thunder Bay River, and from the same point, WNW $\frac{1}{4}$ N $6\frac{1}{4}$ miles, to abreast of Scare Crow Island, bearing south $\frac{1}{2}$ mile; thence WbyN 4 miles to abreast of Devil River, bearing SWbyW $\frac{1}{4}$ W $\frac{3}{4}$ mile, and run to the docks on this course.

The light at Alpena is on a crib a few yards from the end of the north pier, and shows a light-colored red light, and is visible 12 miles. To enter the harbor, run for the red light on the middle of the bridge, which is $\frac{1}{2}$ mile from the end of the north pier, keeping in the centre between piers. Twelve to 14 feet water. Good holding ground anywhere outside.

From Alpena Piers to Thunder Bay Island Light.

Run out of the river SE $\frac{1}{2}$ S $\frac{3}{4}$ mile, thence ESE $8\frac{1}{4}$ miles, until North Point bears N $1\frac{1}{4}$ miles; thence ENE 4 miles, till the south-east end of the island bears NW $\frac{1}{2}$ mile off, thence up lake.

From Devil River to Thunder Bay Island.

SE point bearing NW $\frac{1}{4}$ mile, NE by E $\frac{1}{4}$ E 13 miles.

From Point Au Barques.

Bearing west 5 miles to Thunder Bay Island light, bearing west 2 miles, N by W $\frac{3}{4}$ W 73 miles. Thunder Bay Island light, on north side of entrance to Thunder Bay, Mich., is a white flash light, time between flashes 1 minute 30 seconds; distance visible 14 miles. Note—this light has been seen 20 miles often—is 59 feet above lake level, and bears from Middle Island NNW $\frac{3}{4}$ W 12 miles. A ten inch steam fog whistle, giving a blast of 8 seconds, followed by an interval of 10 seconds, then a blast of two seconds, followed by an interval of 40 seconds, altering this way every minute.

From Thunder Bay Island Light.

Bearing west 2 miles, steer NNW $\frac{1}{4}$ W 26 miles, to Presqu'ile; North Point Lighthouse bearing W by S $\frac{1}{2}$ S 5 miles.

Presqu'ile Harbor Ranges.

Two lights, white, visible 10 and 12 miles, inside the harbor of Presqu'ile. Front light in wooden tower; rear light on keeper's dwelling, distance apart 1,000 feet, bearing east and west. In approaching the entrance to the harbor, when in 7 fathoms water, bring the two lights in range, and run in till in the middle of the bay for an anchorage, in $3\frac{1}{2}$ fathoms, or run to the docks. Depth of water over bar 12 feet.

Presqu'ile North Point Light.

Is a fixed white light, visible $18\frac{1}{2}$ miles, stands 123 feet above lake level, and is a coast light, and a good leading mark up or down the lake.

From Presqu'ile North Point Light.

Bearing W by S $\frac{1}{2}$ S 2 miles, to Cheboygan, Mich., steer NW by W $\frac{3}{4}$ W 47 miles; thence west 8 miles to abreast of Cheboygan Lighthouse, one mile south. Cheboygan light, on the main land opposite to Bois Blanc Island, marking the eastern entrance to the Straits of Mackinaw, Mich, south channel. The south point of Bois Blanc

Island bears north, and the channel opposite the light is 3 miles wide. Old Fort Mackinaw on the main, NWbyW $\frac{1}{4}$ W, 16 $\frac{3}{4}$ miles. Cheboygan light is fixed, varied by white flashes, time between flashes, 1 minute and 30 seconds, visible 12 miles, and is 37 feet above lake level. A flat makes from the lighthouse around the point to the westward and into Duncan Bay, and drops off pretty suddenly.

From Presqu'ile North Point Lighthouse.

Bearing WbyS $\frac{1}{2}$ S, 2 miles to Bois Blanc Lighthouse, NWbyW $\frac{1}{4}$ W 58 miles, to a point $\frac{1}{2}$ mile north of the light; thence W $\frac{3}{4}$ N 9 $\frac{1}{2}$ miles to Mackinaw. On this course you pass Spectacle Reef Lighthouse, 4 miles to the northward.

Spectacle Reef Lighthouse.

Is on the westerly edge of the reef, to the eastward of the entrance to the Straits of Mackinaw in Lake Huron. Flashes red and white, at intervals of thirty seconds, visible 16 $\frac{3}{4}$ miles, height of light above lake level 86 feet. A square wooden pier, 12 feet above water, surrounds the tower. A ten inch steam fog whistle, gives a blast of 3 seconds, followed by an interval of 12 seconds; then a blast of 3 seconds, followed by a pause of 42 seconds, and in the same way every minute.

Bois Blanc Lighthouse, on the north side of Bois Blanc Island, in the Strait of Mackinaw; is a fixed white light, visible 13 $\frac{1}{2}$ miles, 53 feet above lake level, and is a guide to the north channel of Mackinaw.

From Presqu'ile North Point Lighthouse to Detour.

From the light bearing WbyS $\frac{1}{2}$ S 2 miles, steer NWbyN 47 miles, bring Detour light to bear west, and run up river. Detour light, at the mouth of St. Mary's River, is a fixed white light, visible 15 $\frac{1}{2}$ miles, 75 feet above lake level, and marks the entrance to St. Mary's River. A 10 inch steam fog whistle, giving every minute a blast of 10 seconds, followed by an interval of 50 seconds. Garden City Reef WSW $\frac{1}{2}$ W 11 $\frac{1}{2}$ miles, Spectacle Reef, SW $\frac{1}{2}$ S 17 miles.

**From Point Aux Barques, to pass to Southward of the
Charity Islands.**

When abreast of Port Austin steer WSW $22\frac{1}{2}$ miles, till Oak Point bears east, and Sandy Point due south; then haul up west for $4\frac{3}{4}$ miles, till the lighthouse on Charity Island is in range with the west end of Little Charity Island; thence SW $\frac{1}{2}$ S for Saginaw River, $27\frac{1}{2}$ miles.

To enter Saginaw Bay from the North.

Follow down the coast to Sauble Point, and note that there is a shoal extending $\frac{3}{4}$ of a mile from the shore above Sauble River. When Sauble Point bears NW, distance 4 miles, steer SWbyS for the mouth of Saginaw River, distance 52 miles.

To make the dock at Forestville and White Rock.

Bring them to bear due west at a distance of 2 miles, and run in on that course.

To make the dock at Willow River.

Bring it to bear due south at a distance of 2 miles, and run in on that course.

To enter Port Austin.

Run the coast along from Point aux Barques at the distance of 3 miles, till the mill chimney bears due south when you can run for the dock on this course, keeping a lookout for a rocky spot to NW off the end of the dock. A lighthouse is now being erected on the end of the reef off Point Aux Barques, (proper).

To enter Wild Fowl Bay.

After crossing the Little Charity Flat from Pigeon Bay, as previously directed, steer due south till Sandy Point bears east. Then steer ESE into the Bay, when haul up for the land, not approaching nearer than a mile to the north shore, as a bank puts off that distance. Excellent holding ground and protection from all winds is found in this secure harbor, in 12 to 14 feet water.

To make the Mouth of Pine River.

In weathering Point aux Gres, look out for the spit projecting

from Rifle River, which extends to a point SW from Point aux Gres, and distant 3 miles. After turning this spit, run west into 10 feet water, which will be found within a mile of the shore.

To enter Wild Fowl Bay from Saginaw River.

Steer NE $\frac{3}{4}$ E for Sandy Point and when midway between Sandy Point and North Island, steer east into the bay.

To make Otter Bay, or Tawas, from the South.

After passing Charity Island Lighthouse and getting it to bear SE, steer up north for Tawas Bay. The anchorage is good in all parts of the upper bay, and generally around the shores, except about Charity Islands, where it is rocky. Good holding ground is found under Sauble Point, and protection from all winds but SW and SE; close under the land around Gravelly Point there is good holding ground; and along the shores of this bay the water is deep close in on the north side.

To enter Thunder Bay from the South.

When abreast of Point aux Barques Light, bearing due west and distant 5 miles, steer NNW for 65 miles. And from Saginaw Bay, when Point Sauble bears NW distant 2 miles, steer N by E for 40 miles; run the shore along at a distance of 2 miles, till the south point of Thunder Bay bears due west; thence to Thunder Bay River NW $\frac{1}{2}$ N 16 $\frac{1}{2}$ miles. Anchorage outside the bar $\frac{1}{2}$ a mile from shore, in 16 feet water.

To make a harbor between Thunder Bay Island and Sugar Island.

From the point mentioned, steer north 11 miles; run in on this course midway between the two islands, and anchor in 14 feet water, abreast the houses (Faxon's) on the port side.

NOTE.—There is a passage of 9 feet water, nearly straight out from the middle of the bay, NW by N. (See below.)

To enter the Harbor from the Eastward.

Keep round the island, giving the SE point a berth of $\frac{1}{4}$ of a mile, till you get the opening between the two islands about N and

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S; when run in as above directed, keeping a lookout for the shoals projecting from each side, which shoals protect the harbor from southerly winds.

NOTE.—This Bay is called Paxton's Bay.

To make Devil River from the Eastward.

From the SE point of Thunder Bay Island, steer SW by W $\frac{1}{4}$ W 13 miles, till the houses are seen distinctly, when run in and come to, as above directed.

General Remarks.

The shores of Thunder Bay are generally good holding ground. Excellent holding ground under the north point, in $3\frac{1}{2}$ to 6 fathoms, and all along the north shore of the Bay. Good protection from all winds except SE. Good anchorage, clay and sand, is found to the north of Gull Island.

NOTE.—Paxton's Bay, between Thunder Bay and Sugar Island, can be entered from the north as well as the south; but it would not be safe for a stranger to try it from the north, as the channel is not quite straight. The holding ground to the SW and south of the islands is not good, being rocky, but under the north point it is good. Good anchorage under Sugar Island.

There is a channel of 14 feet water between Sugar Island and the main shore. To pass through it from the south, bring north point to bear west; distance $\frac{3}{4}$ of a mile; and run due north till Gull Island is passed, then haul up NNW for Middle Island.

NOTE.—During the prevalence of easterly gales from north to south the water in the Bay is raised, and in like manner depressed during westerly gales.

Dangers on Lake Huron.

From Fort Gratiot to Point aux Barques Lighthouse, the coast as far as Blue Ledge can be approached within a quarter of a mile. Off Indian Creek and White Rock Point there are rocks and rocky spots within $\frac{1}{2}$ a mile of the shore which character continues to Elm Creek, at which place a bad spit extends in a NE direction for $\frac{3}{4}$ of a mile. There are several dangerous ledges running N and S about

a mile from the shore, off Forest Bay; from thence to Point aux Barques Lighthouse. Boulders and rocky spots are found within $\frac{3}{4}$ of a mile of the shore, from the Light to Point aux Barques (proper).

There are ledges and detached rocky spots, rendering the coast dangerous, within $1\frac{1}{2}$ miles from the shore. There is a 4 foot spot $\frac{3}{4}$ of a mile east, and a 9 foot spot $1\frac{1}{4}$ miles NNE of lighthouse. Orion Rock, with 6 feet water, lies $1\frac{1}{4}$ miles NW of Willow Creek wharf. A bad Ledge extends $\frac{3}{4}$ of a mile from NW to NE from Burnt Cabin Point. Point aux Barques Reef (proper) extends NW $1\frac{3}{4}$ miles.

From Point aux Barques (proper) to Sauble Point Flat, off Port Austin wharf, $\frac{1}{2}$ a mile to the NW. Shoal ground off Flat Rock Point, extends out $\frac{1}{2}$ a mile, and continues out this distance along the coast to Partridge River. Two shoals $2\frac{1}{2}$ miles from shore, off Partridge River; good water inside of them. Spit from Hat Point extends one mile to the northward. There is a shoal spot $1\frac{1}{2}$ miles WNW from Little Oak Point. Foul ground around the Charity Islands, extending $1\frac{1}{4}$ miles to the northward, and $1\frac{1}{4}$ miles to the eastward of the lighthouse. A flat extends for 1 mile to the westward of Big Charity Island; and there is a rocky spot $1\frac{1}{4}$ miles SE of Little Charity Island. A sand bank with 10 feet water, extends from Little Charity to the main land, and a spit puts out from the Sand Point in a NW direction, for $1\frac{1}{4}$ miles, with 1 foot least water on it. A flat of sand extends 4 miles from the shore, near Quannakisse, and continues around the south shore; being at Saginaw River and Ogahkahning River, 2 miles from shore. Sand Spit 2 miles SE from Nayahquing Point, also one extending 3 miles east from Potato River, and another $3\frac{1}{4}$ miles E by S from Saginaw River. There is a flat in Pine River Bay extending out three miles from shore; and a rocky spit $2\frac{1}{2}$ miles SE by S from the mouth of Rifle River; a rocky spit 1 mile east of Point aux Gres; and a two fathom spot $\frac{3}{4}$ of a mile ES E from Gravelly Point; a 7 foot shoal 1 mile SE of White Stone Point; a sand spit $\frac{3}{4}$ of a mile in a SW and westerly direction from Ottawa Point; a spit extends $\frac{1}{2}$ a mile to southward of Sauble Point.

NOTE.—These remarks take you clear round Saginaw Bay.

From Sauble Point to Black River Island.

A 10 foot spot 1 mile from shore, seven miles north of Sauble River. Spit off Sturgeon Point extending $\frac{1}{2}$ a mile ENE. Rocky spots extending out $1\frac{1}{4}$ miles east, off Black River. Foul ground around Black River Island, extending ENE for $\frac{3}{4}$ of a mile, and from thence to main shore.

Thunder Bay.

Foul ground around South Point and islands. Shores shoal from thence to Devil River; 6 foot spot $\frac{3}{4}$ of a mile to northward of Sulphur Island; 11 foot shoal $1\frac{1}{2}$ miles NE of Partridge Point. Flat in bay west of White Fish Point; 12 foot spot 1 mile SE of North Point. Foul ground and rocky lumps between Sugar Island and main land. Spits extending SE of Sugar Island and $\frac{1}{4}$ of a mile SE of Thunder Bay Island.

From Thunder Bay to Straits of Mackinaw.

Shoal $\frac{3}{4}$ of a mile SE of Middle Island. Flats $\frac{1}{2}$ a mile from SW point, and $\frac{1}{4}$ of a mile from NW point of Middle Island. Second class iron buoy, red, off the SE side of Middle Island; SE point of Middle Island WNW $\frac{1}{4}$ W, distant $\frac{7}{8}$ of a mile, in 21 feet water. Vessels from the northward will pass outside of the buoy, and continue beyond it a quarter of a mile, and then steer WbyS $\frac{1}{2}$ S until abreast of the middle of the island, and then haul up for the anchorage. A 10 foot spot $\frac{1}{2}$ of a mile NW of first point below Presqu'ile harbor; a 10 foot spot $\frac{3}{4}$ of a mile SE of Presqu'ile lighthouse, and a 5 foot spot 1 mile SE from Adam's Point.

NOTE.—In running along shore from Presqu'ile, up or down, it is always better to keep the west shore pretty well aboard, say from 2 to 5 miles; and should a fog close in on you in the neighborhood of the turning point towards Cheboygan, you have only to keep the lead going, and after running as near as possible your distance from Presqu'ile, which is 50 miles, you may safely haul up to the westward for Cheboygan Lighthouse; after which, shape your course for Old Point Mackinaw, NW by W $\frac{1}{4}$ W 16 miles.

See entrance to Straits of Mackinaw.

From Detour to False Detour.

A 10 foot spot $2\frac{1}{4}$ miles E by S from Detour lighthouse. Detached shoal 1 mile from shore, and $12\frac{1}{2}$ miles east of Detour lighthouse. Spit extending $1\frac{1}{2}$ miles from shore, $2\frac{1}{2}$ miles west of Harbor Island. Shoal spot $\frac{1}{2}$ of a mile SW from east point of entrance to False Detour.

Canadian Shore from False Detour to St. Clair.

Magnetic reefs in Mississauga Passage. Reefs between this passage and Green Island, and those around the Duck Islands Reef between Providence and Michael Bay, and off south point of Michael Bay. Eleven foot spot in Cove Island Passage NW from lighthouse, distance 2 miles. Spit extending $\frac{1}{2}$ a mile west from Gat Point on Cove Island. Reefs extending out 3 miles between Cove Island and Cape Hurd. From Cape Hurd to the Chantry Islands the coast is very rocky, and dangerous for strangers, within $1\frac{1}{2}$ miles from the shore. The same character is given to the coast from the Chantry Islands to Point Clark. At Point Clark a reef extends from the shore, which, together with a detached shoal, requires that this point should have a berth of $1\frac{1}{2}$ miles given it. From Point Clark to Goderich the coast is less dangerous, and may be approached safely within $\frac{1}{2}$ a mile. The same is said of the coast from Goderich to Cape Ippewash. At Cape Ippewash a dangerous ledge extends to the northward for $1\frac{1}{2}$ miles; and between Cape Ippewash and Point Harris there are boulders and rocky spots within 1 mile of the shore.

From Point Harris to the head of the St. Clair River the coast is bold and gradually shelving, and can be approached within $\frac{1}{4}$ of a mile with safety.

Harbors of Refuge.

There is an excellent harbor, with protection from all winds, on Drummond Island, 14 miles east of Detour lighthouse. The Detour, False Detour and Mississauga Passages are good harbors. Excellent anchorage will be found in 16 fathoms, SE of Cove Island lighthouse. Protection from westerly winds, and fair holding ground, are found midway between the Chantry Islands and the village called Southamp-

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ton, on the main land. At Inverhuron, south of Point Douglas, is good holding ground and protection from all winds, as far round as NNW. Goderich Harbor is secure from all winds when inside, and the holding ground off Goderich in 3 and 4 fathoms is excellent. The clay banks extending from Goderich to Sauble River makes good holding ground on this part of the coast.

On the east side of Cape Ipperwash, in the bight of the hook, in 4 and 5 fathoms, is excellent holding ground, and protection from all winds except those between NW and NE by N. From Point Harris to the head of St. Clair River, is generally good holding ground.

To Enter Georgian Bay,

From Charity Island lighthouse, bearing SE, distant 3 miles, steer NE 120 miles, till Cove Island lighthouse bears east, distant 3 miles; when enter the passage on the bearing E by N.

From Fort Gratiot Lighthouse to Goderich, and other Points on the Canada Shore.

Steer NE by N 62 miles, till Goderich lighthouse and piers are made.

From Goderich to Inverhuron, steer N $\frac{3}{4}$ W 23 miles, till Point Clark lighthouse bears east, distance 2 miles; then haul up NNE 17 miles, till abreast of Inverhuron; thence NE by N 19 miles, till Chantry Island lighthouse bears SE, distance 2 miles; thence to the entrance of Georgian Bay N by W $\frac{3}{4}$ W, 59 miles, till Cove Island lighthouse bears east, giving Gat Point, on the east side of Cove Island, a berth of $1\frac{1}{2}$ miles, and look out for the reefs extending over 3 miles from the islands, between Cape Hurd and Cove Island. To enter Georgian Bay, run in for Cove Island lighthouse on the bearing E by N, and give the lighthouse point a berth of $\frac{1}{2}$ a mile.

From Presqu'ile to Chantry Island lighthouse NW by W 115 miles. From Cove Island to the entrance of the Straits of Michilimackinac or south channel, Why N 120 miles.

From Saginaw to Goderich.

Run out from Saginaw River and round the Charity Islands, on opposite courses given, from Point aux Barques, until the light at

Point aux Barques bears due south; thence ESE 59 miles, to Goderich.

From Goderich to the Straits of Mackinaw and St. Mary's River.

Steer NW $\frac{3}{4}$ N 140 miles, till Presqu'île lighthouse bears SW by W 5 miles off; from thence NW by N to Detour, and NW by W $\frac{1}{4}$ W for Bois Blanc lighthouse; thence to Mackinaw, as directed before.

From Cove Island to Straits of Michilimackinac and St. Mary's River.

From Cove Island lighthouse, bearing E by N 3 miles off, steer W by N 122 miles, or till the east end of Bois Blanc Island bears NW $\frac{3}{4}$ N and Sheboygan light W $\frac{1}{2}$ S; thence steer west for Sheboygan light until abreast of it, and run up the strait, as before directed.

To make Detour or St. Mary's River, steer W by N, as above, 57 miles, till the Great Duck Island bears due north; then haul up NW by W for the Detour lighthouse, 56 miles, bring it to bear west and run in.

From Southampton to Saginaw Bay.

Steer W by S $\frac{1}{2}$ S for 107 miles, till Charity Island lighthouse bears SE, distant 3 miles; thence up the bay as before directed.

From Southampton to Straits Michilimackinac.

Steer NW by W 113 miles, till Presqu'île lighthouse bears SW by W, distant 5 miles; thence as before directed to the straits.

The above courses and bearings are true, and the distances are statute miles.

From Point aux Barques to Mississagua Strait, Ontario.

From Point aux Barques, bearing west 5 miles, steer N by W $\frac{1}{8}$ W 128 miles, to entrance to Strait of Mississagua, with light bearing east. The lighthouse is on the SW end of Grand Manatoulin Island, and is a guide for vessels through the strait from either entrance. The light is a fixed white light, and can be seen 20 miles. Run through mid-channel. Plenty of water. From 15 to 34 fathoms.

From Point aux Barques to Cove Island, Ont.

From Point aux Barques, bearing west 5 miles, steer NNE $\frac{1}{4}$ E 100 miles. The lighthouse stands on the northeast point of Island, main entrance to Georgian Bay. Flashes white every one and a half minutes; visible 15 miles, and stands 90 feet above lake level.

From Sheboygan, Michigan, South of the Straits of Mackinaw, to Cove Island.

Run out from abreast Cheboygan lighthouse $\frac{1}{2}$ mile, then due east 8 miles; thence E by S 125 miles to abreast the light, bearing south $\frac{3}{4}$ mile off.

From mouth of St. Clair River to Goderich, Ontario, NE by N 62 miles. Goderich main light, on high bank south of entrance to the harbor, is a fixed white light, visible 25 miles; stands 150 feet above lake level; beacon and range light on the north pier; red in front and white in rear; depth of water, 15 feet.

From mouth of St. Clair River to Point Clark light, bearing east 3 miles; thence same course to Inverhuron 17 $\frac{1}{2}$ miles. Point Clark light is a white flash light; flashes every minute; visible 15 miles; 87 feet above lake level. From Inverhuron, bearing due east 3 miles to Chantry Island lighthouse, bearing SE $2\frac{1}{2}$ miles; steer NE by N 19 miles. Chantry Island lighthouse, south side, about $2\frac{1}{2}$ miles from Saugeen River; fixed white light, visible 15 miles; 86 feet above lake level, and is the guide to Southampton.

NOTE.—Directions for these harbors will be given in remarks.

Kincardine Harbor, 10 miles NE by N from Clark's Point; has a light on the north pier, fixed red, visible 15 miles, 37 feet above lake level. This light shows from all points of approach.

From Cove Island to Michael's Point Lighthouse.

Bearing east $24\frac{1}{2}$ miles. When the light bears east the bay will be open, run in E by N $\frac{1}{2}$ N. Michael's Point light is on the south side of the Great Manitoulin Island, on the SE point of the bay. A rocky shoal sets off this point two miles W by S, and to make the harbor from the southward, you run past the lighthouse until it bears as above.

The light is a fixed white light, visible 13 miles, and 40 feet above lake level.

Georgian Bay, Ontario.

Griffith Island Light, on NNE end of island, 20 miles from Owen Sound; is a fixed white light visible 12 miles, stands 130 feet above lake level. The water is very deep close in on the west side of this island and also the main shore.

Nottawasaga Island, 4 miles from Collingwood NW. Light flashes white, every half minute; visible 10 miles, 86 feet high, and is the leading mark for Collingwood.

Collingwood Harbor, Breakwater Pier Light. Fixed red, visible 6 miles, on frame work, 24 feet above lake level.

Christian Island Light, on SE point of Island, $1\frac{1}{4}$ miles from the main land; fixed white, visible 8 miles.

Gin Rock, Gloucester Bay, for guiding vessels into Penetan Guishene, and Maitland Harbor; fixed white, visible 10 miles.

Georgian Bay and the Canada Side of Lake Huron.

From Fort Gratiot Lighthouse to Cape Ipperwash, Ontario, NE $\frac{1}{2}$ E 25 miles; and note that a reef sets off this point in a north-westerly direction 2 miles, with 6 to 8 feet water on it, rock.

Sauble River is in the bight of the bay to the northward of this reef.

From Fort Gratiot to Pine Brook, Ontario, NbyE $\frac{3}{4}$ E 76 miles.

From Fort Gratiot to Cape Hurd, Ontario, NbyE $\frac{1}{2}$ E 155 miles.

From Fort Gratiot to Horse Shoe or Lucas Island N $\frac{3}{4}$ E 171 miles.

From Point aux Barques, U. S., to Goderich, Ontario, EbyS $\frac{3}{4}$ S 54 miles.

From Thunder Bay Island Lighthouse, U. S., to the Chantry Islands, Ontario, ESE 95 miles.

The Saugeen River is a little to the northward of these islands, and has from 6 to 7 feet of water over the bar. The coast from this up to Cape Hurd is very rocky, and should not be approached without a pilot in less than 7 fathoms water.

From Thunder Bay Island Lighthouse, U. S., to Cape Hurd, Ontario, EbN 78 miles.

From Goderich, Ontario, to the Detour Lighthouse, U. S., NW $\frac{3}{4}$ N 141 miles, to abreast of Presqu'île; thence NWbyN 47 miles.

From Goderich, Ontario, to Mackinaw.

From Goderich to Presqu'île NW $\frac{3}{4}$ N 135 miles, to abreast of Presqu'île, bearing west, 8 miles off; thence NWbyW $\frac{1}{4}$ W 65 $\frac{1}{2}$ miles to Bois Blanc Island Lighthouse; thence W $\frac{3}{4}$ N 9 $\frac{1}{2}$ miles to Mackinaw Harbor.

From Cove Island, Ontario, to the Outer Duck Island WbyN $\frac{1}{2}$ N 53 miles.

From Outer Duck Island, Ontario, to the Detour Lighthouse, U. S., NWbyW $\frac{1}{4}$ W 48 miles.

From Sulphur Island (inside the islands) to Clapperton Island Ontario, E $\frac{1}{2}$ S 60 miles.

From Christian Island, south point, to Owen Sound, Ontario, W $\frac{1}{2}$ S 29 miles.

From Christian Island to Cabot's Head, Ontario, NWbyW 56 miles.

From Christian Island to Cape Smyth, Manitoulin Island, NW northerly 86 miles.

From Collingwood to Tiny Mills NE $\frac{3}{4}$ N 14 miles.

From Collingwood to Lighthouse on Christian Island NNE $\frac{3}{4}$ N 18 miles.

From Collingwood to Western Islands NbyW 38 miles.

From Collingwood to French River, entrance NNW $\frac{1}{4}$ N 100 miles.

From Collingwood to Lonely Island NW $\frac{1}{2}$ N 86 miles.

From Collingwood to Cabot's head NW 65 miles.

From Lonely Island, the route is past Cape Smyth (or around George Island to Shebawananing) to Badgely Island 24 miles; from Badgely Island run to the southward of Strawberry Island, and up to Little Currant; from Little Currant to Clapperton Island (passing either north or south of it); and from Clapperton Island to Sulphur

Island $W\frac{1}{2}N$ 60 nights; thence from Sulphur Island to Bruce Mines; thence through intricate channels to St. Mary's River.

From Mackinaw to Collingwood, Ontario.

From Mackinaw to Bois Blanc Island Lighthouse $E\frac{3}{4}S$ $9\frac{1}{2}$ miles; thence ESE $5\frac{1}{2}$ miles, to abreast of the SE point of the same; thence $EbyS\frac{1}{4}S$ $135\frac{1}{2}$ miles to Cove Island. Keep to the northward of Cove Island, pretty close to, in 23 feet of water; and after passing the north point of the island where the light stands, haul up for Echo Island, and run along to the eastward, pretty close to the Bear's Rump, which is 7 or 8 miles from the Lighthouse, leaving two shoals—the White Shingle Island and shoal, and Snake Island, to the northward. The first or outer shoal bears $NNW\frac{3}{4}W$ from Cove Island and Lighthouse $1\frac{3}{4}$ to 2 miles; and the second bears $SbyE$ from White Shingle Island, with 13 feet water on it. You will carry deep water until you are past Echo Island; leaving it to starboard, run for the Bear's Rump, which is the next island to the eastward, with deep water close to; leaving it and the Flower Pots to starboard also; when past the Bear's Rump, haul up $SEbyE\frac{3}{4}E$ for Cabot's Head, about 15 miles; thence $SE\frac{1}{4}S$ 60 miles for Collingwood.

From Cabot's Head to Bear's Rump $WbyN$ 15 miles, leaving the Rump to starboard, and the Flower Pots to port; thence the same course to Cove Island Lighthouse 7 miles.

To Run Through the Channel to the Southward of Cove Island.

After clearing the west point of the island, which is shoal, keep along the south side of the island pretty close to, leaving Cove Island and several small islands to the northward, and Middle Island on either side, steering due east 23 miles from Middle Island, or until Cabot's Head bears $SWbyW$ 4 or 5 miles distant; thence $SE\frac{1}{4}S$ 60 miles to Collingwood Harbor. This route runs you about $3\frac{1}{2}$ miles from Surprise Shoal and $5\frac{1}{2}$ from Cape Croaker.

From Cabot's Head to Penetanguishene.

From Cabot's Head to the Giant's Tomb ESE 60 miles. In running on this route to Penetanguishene, you leave a group of small

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islands, called the Western Islands, about 1 $\frac{1}{2}$ to 2 miles to the northward, and Hope Island, close to, to the southward. When past Hope Island, haul up SE $\frac{1}{2}$ E for the mainland, leaving the Giant's Tomb Island well to port to clear some rocks which lie off the SE end of the island; follow the shore round until nearly abreast of Pine Point; then haul over to port, keeping the islands best aboard until above the point; then haul up to the SW and run into the bay.

It is necessary to take a pilot on first going into Penetanguishene Harbor. There is plenty of room after passing Pine Point.

From Cabot's Head to Penetanguishene, through the Christian Island Channel.

From Cabot's Head to Christian Islands ESE $\frac{1}{4}$ S 54 $\frac{1}{2}$ miles. In running through this channel, keep Hope Island to port, Christian and Beckwith to starboard; and when past Beckwith Island haul up for the mainland about ESE 6 miles, and run into Penetanguishene as directed above from Hope Island.

From Collingwood to Penetanguishene, Leaving the Christian Islands to the Northward.

From Collingwood to Christian Island Lighthouse NNE $\frac{3}{4}$ N 18 miles; thence run the main shore from point to point, at a distance of $\frac{1}{2}$ to 1 mile, till abreast of the Giant's Tomb Island; then run as directed above.

SE from the lighthouse is a patch of rocks off the mainland about $\frac{1}{2}$ a mile. The depth of water in this channel is from 17 to 18 feet, until well past the lighthouse. To make a harbor, haul up into the bay to the northward, and come to in 3 fathoms water close in.

The Duck Islands, Lake Huron.

The Duck Islands lie N by E $\frac{1}{4}$ E 43 miles from Thunder Bay Island Lighthouse, U. S., and W by N $\frac{3}{4}$ N 63 miles from Cove Island, Ontario.

There is good holding ground between the Great Duck and Outer Duck Islands. The Outer Duck is to the eastward of the Great

Duck, off the south end of it. To make a harbor, bring the passage open between the two islands, bearing N by W $\frac{1}{4}$ W, and haul up on that course, leaving the reef off each island on each side, in 22 to 30 feet of water. There is 15 feet of water on the end of the Great Duck Shoal, and 11 on the Outer Duck. These two reefs run out about SSE, which makes a good lee. Run well up and past the south end of the Great Duck, and come to; anchor in any part of the bay.

There are two good passages between these islands; one between the Great Duck and Middle Duck, and the other between the West Duck and Middle Duck. These passages can be plainly seen in clear weather.

To Run into Georgian Bay by Fitzwilliam Island Channel.

From the Duck Islands to the south point of Fitzwilliam Island E by S 60 miles. When abreast the point haul up NE 4 miles, leaving Lucas Island and Yeo Island to starboard, (and note that a small island named James Island, with a reef running SW from it, lays NE from Yeo Island); thence SE by E $26\frac{1}{4}$ miles to Cabot's Head, leaving Half Moon Island $3\frac{1}{4}$ miles to the northward. Nothing less than 30 to 40 feet through this channel. To run through to the southward of Lucas Island, leave Yeo Island and James Island NE of Lucas, to the northward, steering due east for 11 miles; thence SE by E for Cabot's Head.

Cape Hurd Channel is very difficult, and cannot be run except with a good pilot.

Tober Moray or Collins' Harbor is an excellent one, lying SE southerly from the east end of Cove Island, and is easy of access by daylight.

Mississauga Passage is deep—from 30 to 204 feet water. To run through, open the passage and steer about N $\frac{1}{2}$ W, keeping the east side best aboard. The west side, at the entrance, is rocky, and composed of magnetic reefs. To clear the rocks on the east side before entering the channel, keep the NE point of Cockburn Island open with the SW point of the Great Manitoulin Island, and when through, haul up NW by W 22 miles, for Sulphur Island.

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The False Detour Passage is deep, but not quite so straight as the Mississauga Channel. To run through, keep midway, in 54 to 120 feet water. Rocky on both sides. After getting well into the channel, the course is about NNE; when through, steer NW for Sulphur Island 14 miles.

Byng Inlet, fixed white light.

Lonely Island, a fixed white light, visible 20 miles, 195 feet above lake level.

Parry Sound, on Mink Island; a fixed white light, visible 16 miles, white square tower, on dwelling, 56 feet above lake level.

Red Rock Point, one mile east of Killarney, north side of channel leading into Killarney harbor; is a fixed white light, visible 8 miles.

Partridge Island, one and a half miles northwest of Red Rock light; fixed white light, visible 5 miles, 30 feet above lake level.

Shaftesbury or Little Current, range lights, fixed white, visible 6 miles.

Clapperton Island, north point; a fixed white light, visible 8 miles, 35 feet above lake level.

Sulphur Island, west end of island; fixed white light, visible 12 miles, 45 feet above lake level.

Duck Island light in course of construction.

All the Canadian lights are corrected copies of William Smith, Deputy Minister of Marine and Fisheries of the Dominion of Canada for 1877. The bearings are magnetic, and given from seaward.



Straits of Mackinaw and Lake Mich.

From Duncan Docks North One and a Half miles, to Abreast of Cheboygan River.

The light at Duncan is a white light; stands on the end of the warehouse dock; is a private light, and can be seen 8 miles. Cheboygan River entrance has been dredged to 14 feet water. Range lights are kept in the harbor; white and red, white above red. Range the lights and run in; two barrel buoys, red, to starboard, and two barrel buoys, black, to port, at the entrance of the cut. The channel is straight. The lights are private lights.

From Cheboygan to McGulpin's Point.

NW by W $\frac{1}{4}$ W 16 $\frac{1}{2}$ miles to Old Point Mackinaw; give the point a berth of $\frac{3}{4}$ mile, and follow the land round at that distance to abreast of McGulpin's Point Lighthouse. Vessels drawing 14 feet should give the point a berth of 1 $\frac{1}{2}$ miles; thence to Point Waugoshance Lighthouse, W $\frac{1}{4}$ S 17 $\frac{1}{2}$ miles, which may be approached to within $\frac{1}{2}$ mile. McGulpin's Point Lighthouse marks the turning point in the Straits of Mackinaw 2 $\frac{1}{2}$ miles west of Old Fort Mackinaw, and a guide through the Straits. The channel abreast of this light is 3 miles wide. The South Graham Shoal, NE $\frac{1}{4}$ E. 4 $\frac{1}{4}$ miles; St. Helena Island, NW 6 miles; Waugoshance, W 15 $\frac{1}{2}$ miles from light to light; is a fixed white light, visible 17 $\frac{1}{2}$ miles; stands 102 feet above lake level, and is to have a syren erected this year.

Waugoshance Lighthouse, on Waugoshance Shoal, and the Straits of Mackinaw, near the entrance to Lake Michigan. Tower and dwelling attached, of brick; keeper's dwelling and lower part of the tower white; upper part of the tower black; marks Waugoshance Shoal and turning point at western end of Straits of Mackinaw. St.

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Helena reef NE by E $9\frac{3}{4}$ miles; the southwest end of Manitou Payment Shoal N $\frac{1}{4}$ E 12 miles; the east end of Simmons' reef NNW $\frac{1}{2}$ W $10\frac{1}{2}$ miles; White Shoals NW $\frac{1}{4}$ N $4\frac{1}{2}$ miles; Gray's reef W $5\frac{1}{4}$ miles; Hog Island reef WSW $\frac{1}{4}$ W $12\frac{1}{2}$ miles; Skilligalee Light SSW $\frac{1}{2}$ W $8\frac{1}{4}$ miles. Light fixed, varied by white flashes; visible 15 miles; stands 74 feet above lake level, and is built on a crib.

From Mackinaw to St. Helena Island and Point Waugoshance.

From the middle of Mackinaw Harbor, W by S $\frac{3}{4}$ S $4\frac{1}{2}$ miles, so as to shut in Rabbits Back Peak behind Point St. Ignis; thence W $\frac{1}{2}$ S 19 miles to Point Waugoshance Lighthouse, making it ahead and leaving the height of Round Island dead astern. This route passes $\frac{1}{2}$ a mile south of the reef off Point St. Ignis, sometimes called the Graham Shoals, the most southerly one being well indicated by the following range lines: A line from Grosse Point to St. Ignis, and a line from the NE side of St. Helena to Point la Barb; a red buoy on the southwest point of Mackinaw Island marks the passage between Mackinaw and Round Island; vessels pass to the southward of this buoy 300 feet, and is a guide coming down for the docks at Mackinaw.

South Graham Shoal, a red buoy. This buoy is on the south side of the centre of the shoal, in 14 feet water. The Graham Shoals bear NNE and SSW respectively from each other, five-eighths of a mile. Between the shoals and Point St. Ignis, there are channels which should not be attempted by strangers. The currents in the vicinity of the Graham Shoals and the Straits of Mackinaw are often strong and irregular. After fresh gales, vessels anchored in the straits often trend to windward. The least water on the North Graham, 4 feet, and on the South Graham, 6 feet. North Graham Shoal red buoy is on the south side of the shoal. In passing St. Helena, you leave the lighthouse 3 miles to the northward. St. Helena Lighthouse is on the southeast point of the island, in the Straits of Mackinaw; is a fixed red light, visible $15\frac{1}{4}$ miles, 71 feet above lake level. Tower and dwelling of red brick. The light is to guide vessels under the lee of St. Helena Island. It is also a leading mark for vessels passing to the westward, and, *vice versa*, to the northward of the Beaver Islands.

Waugoshance Light WSW 12 miles. McGulpin's Point Light SW $6\frac{3}{8}$ miles. White Shoals W $\frac{1}{2}$ S 14 miles.

To Make a Harbor at St Helena.

From Old Point Mackinaw NW by W $\frac{1}{4}$ W $6\frac{1}{4}$ miles, leaving Point la Barb at a distance of $1\frac{3}{4}$ miles to starboard, and the island and light to port; haul round the NE point of the island, giving it a good berth, and come to anchor in the bay to the northward of the dock, in 5 to 9 fathoms water. Soft bottom.

To leave St. Helena. North about; haul close round the NW end of the island, and steer W by S $\frac{1}{2}$ S 3 miles, to clear a shoal which lies due west $1\frac{3}{4}$ miles from it; thence WSW $\frac{1}{2}$ S 10 miles to Point Waugoshance. A buoy is placed on this shoal, painted red and black horizontal stripes. This buoy is on the south side of the centre of the shoal; soundings are irregular; rocky bottom, with from 3 to 4 fathoms close to. This shoal is about 450 yards in extent, northwest and southeast, and 300 yards northeast and southwest. Least water, 9 feet.

From Waugoshance to Mainitou Passage.

SW $\frac{1}{2}$ S $7\frac{1}{2}$ miles. The White Shoals, has a first class iron can buoy, with red and black horizontal stripes. The White Shoals are composed of three irregular rocky reefs, extending east and west about one half a mile. The buoy is placed between the southwest shoals in $3\frac{1}{2}$ fathoms water. The least water on this shoal is four feet. Waugoshance Lighthouse, SE $\frac{1}{2}$ S $4\frac{1}{2}$ of a mile; North point of Hat Island, W $\frac{1}{2}$ S $7\frac{1}{8}$ miles; southeast point of Gray's reef, SW by W $4\frac{1}{3}$ miles.

Gray's Reef, a first-class iron can buoy, red. Gray's reefs are composed of six shoals, the greatest extent is east and west 2 miles; north and south, $1\frac{3}{8}$ miles, least water 3 feet. The buoy is placed on the east end of the shoals, in 3 fathoms water. The soundings between these reefs and Hat island are irregular and foul. Strangers should not attempt to pass to the westward of the buoy. Waugoshance Lighthouse, east $5\frac{1}{2}$ miles; Skillegalee Lighthouse S by E 8 miles; north point of Hat Island WNW 5 miles; White Shoals NE by N 4

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miles. In running on the course SW $\frac{1}{2}$ S for the Manitou Passage, from point Waugoshance, you leave Skillealee Lighthouse 2 miles east from you. Skillealee Lighthouse stands on Skillealee rock, $8\frac{1}{4}$ miles SSW $\frac{1}{2}$ W from Waugoshance light, and 6 miles from the main land, has a first-class steam syren, giving blasts of 7 seconds, at intervals of 42 seconds; is a fixed white light, 106 feet above lake level, visible 18 miles, illuminates the entire horizon; tower and dwelling of yellow brick, is a guide to and from the Straits of Mackinaw, 6 miles from the Michigan shore. Reef extends from the light NW $\frac{3}{4}$ of a mile, and NEbyE $\frac{1}{2}$ E $1\frac{1}{2}$ miles. The east end of Hog Island reef bears WNW $8\frac{1}{2}$ miles; the east end of Gray's reef NbyW $\frac{1}{4}$ W, $7\frac{1}{2}$ miles. On the same course SW $\frac{1}{2}$ S you leave Grand Traverse Lighthouse $8\frac{1}{2}$ miles due east. Grand Traverse or Cathead Point Lighthouse stands on the northwest point of Grand Traverse Bay, and is a guide into the bay, and to the passage between the Manitous and Sleeping Bear. The northeast point of the north Manitou, WbyS, 23 miles; is a fixed white light, visible 12 miles, stands 40 feet above lake level.

Mission Point Light, on the north point of the Peninsular dividing Grand Traverse Bay; light on frame dwelling. A guide into the east and west arms of Grand Traverse Bay. Reef extends from this point northward $1\frac{1}{2}$ miles; Northport, N 22° W, distant $11\frac{1}{2}$ miles; Elk Rapids SEbyS $\frac{3}{4}$ S, distant 7 miles; is a fixed white light, visible 13 miles, stands 48 feet above lake level. On same course SW $\frac{1}{2}$ S to Point Betsey $97\frac{1}{2}$ miles, from Point Waugoshance. You leave the South Manitou Lighthouse $3\frac{1}{2}$ miles to the northwest.

South Manitou Lighthouse, on the SE point of the island, is a fixed white light, visible $17\frac{1}{2}$ miles, stands 104 feet above lake level, and has a 10 inch steam fog whistle, giving a blast of 4 seconds during each minute. In case of accidents to the steam fog whistle, a fog bell, struck by machinery, will be sounded. A brick tower, white-washed, guide to anchorage at South Manitou Harbor, and showing the passage between the Manitou Islands, and the main shore; point Betsey light SbyW $\frac{3}{4}$ W 24 miles; Sleeping Bear SbyE $\frac{1}{2}$ E, $7\frac{1}{2}$ miles. The fog signal house is about 34 yards northeast of the lighthouse. Keep on same course to Point Betsey, bearing east 5 miles.

Point Betsey Light, on Point Betsey, 25 miles SbyW $\frac{1}{2}$ W of South Manitou Island, east side of Lake Michigan; is fixed, varied by white flashes, visible 13 miles, stands 53 feet above lake level, tower and dwelling of yellow brick, connected by a covered way. Canah Island Light NW $\frac{3}{4}$ W 48 miles. on the west shore.

From Wangoshance to Beaver Harbor and through the Fox Island Channel Between it and North Manitou Island.

From Wangoshance to the west side of the North Manitou, bearing south, SW $\frac{1}{2}$ W, 61 $\frac{1}{2}$ miles. On this course you leave the south Fox Island Light, 7 $\frac{1}{2}$ miles to starboard. This lighthouse is on the extreme southeast end of South Fox Island, is fixed red, varied by red flashes, 68 feet above lake level, tower rises from dwelling of brick, a guide through the passage 18 miles wide, between South Fox and North Manitou Islands. From the light a bank extends south 9 $\frac{3}{4}$ miles, which is from 1 $\frac{1}{4}$ to 1 $\frac{3}{4}$ miles wide. The soundings are from 4 to 6 and 8 fathoms. To the east, south and west of the bank, there is from 20 to 30 fathoms of water, close to on the bank. There are two small shoals bearing respectively from the light SbyW, 4 $\frac{3}{8}$ miles, and S $\frac{1}{2}$ W 7 $\frac{3}{8}$ miles, with 16 feet water. These two shoals will be buoyed this season, with horizontal black and red striped buoys.

From Wangoshance to the Head of Beaver Island.

Steer SW $\frac{3}{4}$ W for 23 miles, then around Beaver Island for three miles, till Beaver Island Lighthouse bears north 1 $\frac{1}{2}$ miles. The lighthouse is on the south end of Beaver Island, Lake Michigan. Fixed, varied by white flashes; visible 17 $\frac{1}{2}$ miles; stands 103 feet above lake level; tower and dwelling of brick; a guide through the passage between the Beaver and North Fox Islands. This channel is 9 $\frac{1}{2}$ miles wide.

From Wangoshance to Beaver Harbor, Twenty and One-Half Miles.

When $\frac{1}{4}$ mile south of Wangoshance Lighthouse, steer W by S $\frac{1}{4}$ S 12 miles; thence west 8 miles to the dock in the harbor, leaving

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the light to starboard, or come to anchor anywhere near the middle of the bay, in 5 to 9 fathoms water. Soft bottom. The lighthouse is on the north point of the entrance to the harbor; is a fixed red light, visible 12 miles; stands 37 feet above lake level. (There is a life saving station here.) Brick tower and dwelling. Skillegalee light bears E byS $\frac{1}{4}$ S 17 miles. This course would pass seven-eighths of a mile south of Hog Island reef, E $\frac{3}{4}$ S $7\frac{3}{4}$ miles from the harbor. The entrance to Little Traverse Bay SE. 31 miles. A buoy is placed on the east end of Hog Island reef, in 3 fathoms water. The greatest extent of the reef is east and west $\frac{5}{8}$ of a mile, and north and south 233 yards. Least water on the reef 6 feet. The soundings adjacent to the shoalest spot are 4 and 5 fathoms. The buoy is red, with black horizontal stripes. First class iron can buoy. Wangoshance light E byN $\frac{3}{4}$ N $12\frac{1}{2}$ miles. There is good anchorage along the island for 5 miles south of the Beaver Harbor, in 7 to 8 fathoms water. Soft bottom.

From St. Helena Island to Poverty Island Entrance to Green Bay, North of the Beaver Islands.

From St. Helena Island Lighthouse, bearing north $1\frac{1}{2}$ miles, steer W $\frac{1}{2}$ N 40 miles to abreast of Squaw Island, bearing south 2 miles; thence WSW 57 miles to Poverty Island Lighthouse, bearing north one mile off Poverty Island Light, on the south end of Poverty Island; is a flashing red light; time between flashes, fifteen seconds; visible 16 miles; stands 78 feet above lake level, on a circular brick tower, whitewashed. Point Peninsular Light NW byW 18 miles; Pottawatomie Light SW $\frac{3}{4}$ W $10\frac{1}{4}$ miles; background, trees. This light is a guide between the Gull Islands and Poverty Island into Green Bay, thence NW $\frac{1}{2}$ W to Peninsular Point Lighthouse, bearing north $2\frac{3}{4}$ miles. The lighthouse is on the point, between Little and Big Bay de Noquet; flashes white; visible $12\frac{1}{2}$ miles.

NOTE—This light can be seen in clear weather directly after passing Poverty Island; it stands 41 feet above lake level; tower rises from keeper's dwelling; built of yellow brick; marks approach to Little and Big Bay de Noquet. A dangerous shoal extends south from the light $1\frac{1}{2}$ miles. There is also a 11 foot spot S byW $\frac{3}{4}$ W

$2\frac{1}{4}$ miles from the lights. Sand Point Lighthouse bears NW by W $6\frac{1}{2}$ miles; Boyer's Bluff S $\frac{3}{8}$ E 17 miles; south point of Poverty Island SE $\frac{1}{8}$ E 17 miles.

Escanaba Light,

At the extreme end of Sand Point, in Little Bay de Noquet; is a fixed red light, visible 13 miles; 44 feet above lake level, and marks the turning point into the Harbor of Escanaba, and a guide up Little Bay de Noquet. To the eastward of the light is a sand flat, extending a half mile; two black buoys are generally kept on the point of this flat. The ten foot shoal of Point Peninsular; has a third class iron can buoy, placed on the north side of the shoal, in 16 feet water, painted red and black horizontal stripes. There is a passage to the northward, with from 3 to 4 fathoms water. East of this buoy, three-eighths of a mile, is a small 16 foot shoal.

From Beaver Island Light, Bearing North One and a Half Miles, to Rock Island Light.

Steer W $\frac{3}{4}$ S $61\frac{1}{4}$ miles to a point one-quarter of a mile north of Rock Island Lighthouse, keeping a look out for the 10 foot shoal $1\frac{3}{4}$ miles south of St. Martin's Island; thence W $\frac{1}{4}$ S 6 miles, to Boyer's Bluff bearing E by S $\frac{3}{4}$ of a mile.

Rock Island Lighthouse,

Or Pottawatomie, on the north point of Rock Island, north side of the entrance to Green Bay, Michigan; is a fixed white light, visible 19 miles; 137 feet above lake level; light on keeper's dwelling, built of stone; a guide to Green Bay through the passage between Rock Island and St. Martin's Island. A ten foot shoal in the channel bears NE by E $\frac{3}{4}$ E $3\frac{3}{4}$ miles from the light. From the southeast point of Rock Island there are two dangerous reefs with only four feet water, bearing S by E $\frac{1}{2}$ E $2\frac{1}{2}$ miles and SSE $3\frac{3}{4}$ miles. There is a good passage between these reefs and the island, in deep water, and good anchorage can be found in 5 to 6 fathoms in the bight, a little north of the false channel between Rock Island and Washington Island. Vessels from Lake Michigan ports for Green Bay by this

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passage can bring the light to bear W by N to W by S in 18 fathoms water, and stand in, hauling half a mile to the northward as they approach the light, going to the westward. Boyer's Bluff, the northwest point of Washington Island, is one of the most prominent head lands in Green Bay, and is the turning point for Green Bay City in this passage.

From the North Manitou Island to Milwaukee.

With the NW end of the North Manitou, bearing south $4\frac{1}{2}$ miles, steer SW by S $\frac{1}{2}$ S, 186 miles to Milwaukee Lighthouse, on north point of Milwaukee Bay, Wisconsin. Is fixed, varied by white flashes, time between flashes two minutes. visible $17\frac{1}{2}$ miles, stands 102 feet above lake level, and is a coast light, yellow brick tower and dwelling attached, a guide to Milwaukee Bay.

Milwaukee Pier-head Light, on the outer end of the north pier of Milwaukee harbor, fixed red, visible 12 miles, 40 feet above lake level, on a wooden frame work tower painted white, a guide into the harbor. The piers run out E $\frac{1}{2}$ N and W $\frac{1}{2}$ S. A life saving station is in the harbor. A fog whistle will be placed on the north pier end at Milwaukee this Spring. Length of blast 5 seconds, interval 55 seconds, alternate every minute.

From Point Betsey Bearing East Five Miles to Chicago.

Steer S by W $\frac{1}{2}$ W 209 miles. Chicago Lighthouse is on the north pier of Chicago harbor; a fixed white light, visible 16 miles, stands 83 feet above lake level, iron tower, connected by a covered way, with a wooden dwelling painted brown. Pier head light, on the end of the north pier, and a guide to the entrance of Chicago harbor; fixed white light, visible 12 miles, 35 $\frac{1}{2}$ feet above lake level. A wooden tower, marks the outer end of the north pier, and guides into the harbor. Calumet, from inner light, S by E $\frac{1}{2}$ E 12 miles; Water Works Crib, NE $\frac{1}{4}$ E two miles, shows a white light. From the Water Works on shore to the dummy, N 68° 28' E, 2 miles, Chicago piers run out nearly east and west. The breakwater pier runs north and south.

Lights on Breakwater.

The light on the north end is a fixed white light, 24 feet above lake level, on a post 12 inches square, 18 feet high, painted white, visible $10\frac{1}{2}$ miles. The light on the south end of breakwater, is a fixed red light 35 feet above lake level, shown from an open tower and visible 12 miles, each light illuminates the entire horizon, and they are 4,000 feet apart. There is a life saving station in the harbor. Depth of water going in from $14\frac{1}{2}$ to 15 feet; behind breakwater, from 14 to 16 feet water. Dredging going on every season.

Frankfort

Five miles from Point Betsey Lighthouse, on the outer end of the south pier. A fixed red light, visible $11\frac{3}{4}$ miles, 33 $\frac{1}{2}$ feet above lake level, on an open frame work structure near the outer end of the south harbor pier, a guide to vessels entering, best water close to the south pier. This is a good harbor for small vessels. To run in, range the south pier, and follow it up, until into the bay. You can go as far as the iron dock on the starboard side of the bay, with as much water as you can carry in 9 to $9\frac{1}{2}$ feet, come to anchor or run to the docks on the port hand, the bar outside changes from time to time, 10 feet has been carried in.

Manistee Pier Lights.

Near the outer end of the south pier, entrance to Manistee River, 16 miles north of Grand Point Au Sable; fixed red, visible 12 miles, 35 feet above lake level, on an open frame structure, with an elevated walk leading from it to the shore. Tower and walk painted white, the light serves as a guide into the river. This harbor is generally safe for vessels drawing less than 10 feet water. Manitowoc Lighthouse bears WbyS 67 miles.

Grand Point Au Sauble.

Is 48 miles from Point Betsey on the east shore of Lake Michigan, has a fixed white light, visible $17\frac{1}{2}$ miles, stands 106 feet above lake level, tower and dwelling of yellow brick; top of lantern black. A coast light. This is the most western lighthouse on the east coast

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of Lake Michigan. Petite Point Au Sauble, $S\frac{1}{2}W$ 29 miles. Manitowoc light $W\frac{1}{4}N$ 57 miles. A life saving station is located between the Point and Sauble River, about $1\frac{1}{2}$ miles from the point.

Pere Marquette or Ludington.

On the east side of Lake Michigan, 8 miles south of Grand Point Au Sauble. A fixed red light, visible 12 miles, stands 36 feet above lake level, on wooden tower, on the end of the south pier, a guide into the harbor. The best water, from 14 feet, a little north of the centre, between the piers, which run N and $E\frac{1}{4}S$. There is plenty of water up to the mills in the harbor, after getting past the inner end of the piers, and the channel is plain to be seen. The average depth of water is about 12 feet, according to what point the wind is blowing from, &c. A strong current sets along this shore with southerly and SW winds, past Point Betsey and the Manitous. A friend of mine at Frankfort, lost 14 nets in a blow from the SW by the buoys being swept away. He says that the current was running, when he went out for the nets, at the rate of 3 to 4 miles per hour.

Pentwater.

Eleven and one-half miles from Ludington. Light fixed red, visible $11\frac{3}{4}$ miles, on the outer end of the south pier at the harbor of Pentwater, east shore of Lake Michigan, 33 feet above lake level, on an open frame work structure, a guide into the harbor. Best water in mid-channel $9\frac{1}{2}$ to 10 feet. Piers run out W by $N\frac{1}{2}N$ and E by $S\frac{1}{2}S$.

Petite Point Au Sauble.

On Little Point Au Sauble, 30 miles south of Grand Point Au Sauble, east shore. Light fixed, varied by white flashes, time between flashes 30 seconds, 108 feet above lake level, is a lake coast light, Tower and dwelling are of red brick, connected by a covered way and as seen from the lake, are projected against a back ground of sand hills, partially covered with light timber. Grand Point Au Sauble $N\frac{1}{2}E$ 29 miles.

White River.

Light at the mouth of White River, east shore, 12 miles north of Muskegon light. Fixed, varied by red flashes, time between flashes

one minute, visible 14 miles, stands 57 feet above lake level, lake coast and harbor light. A brick dwelling, with square tower rising from its NW corner, stands on south bank of White River, a guide into the harbor.

White River Pier-head Light, fixed red, visible $11\frac{1}{2}$ miles, 33 feet above lake level, on a wooden tower on the outer end of the south harbor pier, a guide into the harbor.

Muskegon Light

At the mouth of Muskegon River. Fixed white, visible 13 miles, 45 feet above lake level, and has a bell, struck by hand, a private enterprise, on keeper's dwelling, on the south side of Muskegon River. Pierhead light, on the outer end of the south pier (Port Sheldon) Muskegon Lake, Michigan, on a wooden tower, a guide into the harbor. On entering between the piers, the best water, from 10 to 12 feet, will be found a little to the south of the centre of the river. Piers run out NE by $E\frac{1}{2}E$ and SW by $W\frac{1}{2}W$. In 1876 the water was 12 to 14 feet.

Buoys in Muskegon Lake.

No 1, 14 foot spar buoy, black. Entrance to Muskegon Lake, west 2 miles; Bank Point, north $\frac{3}{4}$ mile. This buoy is placed on the extreme end of a large flat, setting off the first point on the port side after passing through the entrance from Lake Michigan into Muskegon Lake, called Bank Point, and is nearly in the centre of the lake.

Buoy No. 2, red, 14 foot spar buoy, L. G. Mason's saw mill, south 833 yards. This buoy marks a grassy point near the head of Muskegon Lake, on the south side, known as the Old Foss Point. The dock at the tower of Muskegon, S by $E\frac{1}{4}E$, 733 yards.

Grand Haven.

Light at the south side of the mouth of Grand River, 30 miles north of Kalamazoo River, Mich. Fixed, varied by white flashes, time between flashes 1 minute and 30 seconds, visible 15 miles, 70 feet above lake level. Has a first-class steam syren, giving blasts of

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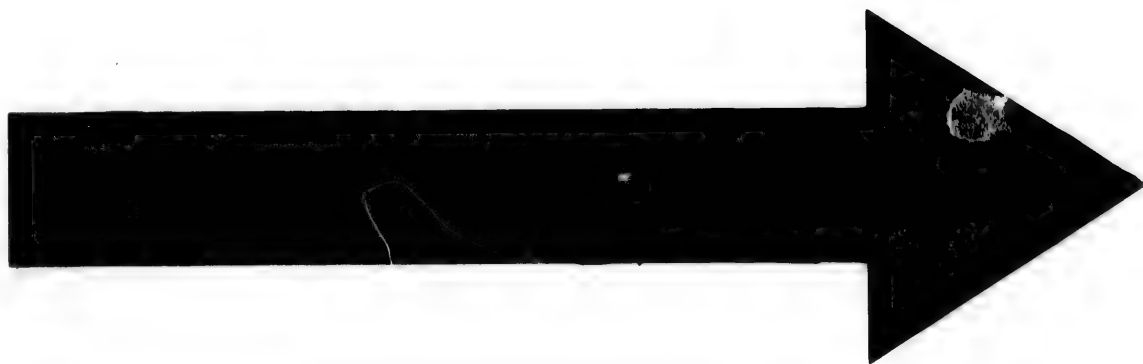
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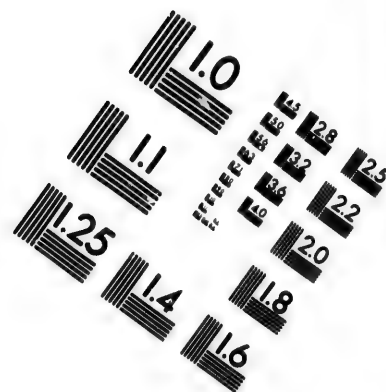
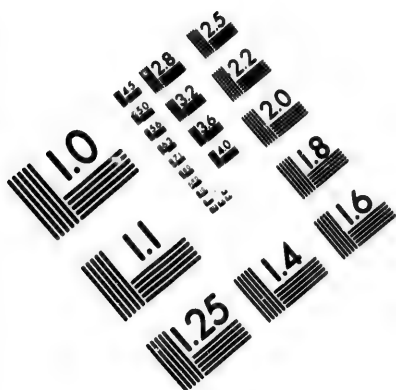
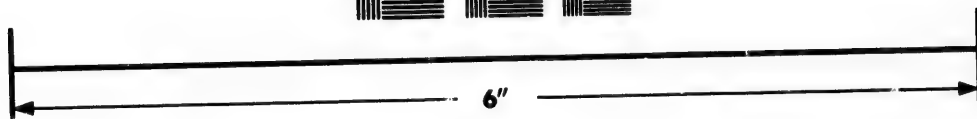
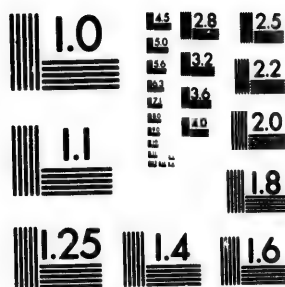


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five seconds, at intervals of thirty seconds. Light on stone and brick tower, which is connected with keeper's dwelling; a coast and harbor light, marking entrance to Grand Haven. Pier-head light, on the south pier of Grand Haven. Fixed white, visible 12 miles, 37 feet above lake level, on a wooden tower, a guide into the river. Muskegon light, N by W $\frac{3}{4}$ W 14 miles; Kalamazoo light S $\frac{1}{2}$ E 27 $\frac{1}{2}$ miles. Buoy off Grand River, black 12 foot spar buoy. This buoy is a guide to the entrance of the piers, and is in 12 feet water, the end of the pier SE 700 feet. Pier runs out E $\frac{3}{4}$ N and W $\frac{3}{4}$ S, 14 to 16 feet water going in. A life saving station is located in the harbor. Railroad dock on the starboard side of the river.

Holland, Black Lake.

Lighthouse on the south pier, at the harbor of Holland, east shore. Is a fixed red light, visible 11 $\frac{1}{2}$ miles; stands 32 feet above lake level; built on a wooden tower on the end of the south pier; a guide into the harbor. Holland piers run out east and west; depth of water, 9 $\frac{1}{2}$ to 10 feet.

Kalamazoo River.

Pier light near the outer end of the south pier, mouth of Kalamazoo River; a fixed red light, visible 11 $\frac{1}{2}$ miles; 34 feet above lake level, on an open frame tower, with an elevated walk leading from it to the shore; painted white; a guide into Kalamazoo River; about 40 miles N by E $\frac{3}{4}$ E of St. Joseph, Michigan. Vessels on entering the piers will find the best water in mid-channel until abreast the slab pier, from 8 to 11 $\frac{1}{2}$ feet water on the port hand, when the channel is close to south pier, until abreast the light keeper's dwelling, on the north side, when the best water will be found midway between the piers. Port Sheldon, north 17 miles; South Haven, S $\frac{3}{4}$ W 16 miles; Chicago Light, SW $\frac{3}{4}$ W 90 miles. The piers run out east one-half, and one-eighth north. Saugatuck is about five miles up river. The river is crooked and narrow; 8 $\frac{1}{2}$ to 9 feet water can be carried up to Saugatuck.

South Haven.

Light on the outer end of the south harbor pier; fixed red, visible 11 $\frac{1}{2}$ miles; 32 feet above lake level, on a wooden tower, at the

mouth of South Black River. South Haven piers run out E by N and W by S; $8\frac{1}{2}$ to 9 and 10 feet water up to the docks. Kalamazoo Light N $\frac{3}{4}$ E 16 miles; Chicago Light SW by W $\frac{1}{4}$ W 82 miles. Keep the south pier best aboard going in.

St. Joseph,

On the south side of the mouth of St. Joseph River, Michigan; light fixed, varied by white flashes; time between flashes, one minute and thirty seconds; stands 101 feet above lake level, on keeper's wooden dwelling, in the town of St. Joseph. A sand bar forms from the north pier well across the entrance to the harbor. Vessels entering have to keep well to the southward, keeping the beacon light on the end of the south pier open on the port hand, until within 100 feet of it, when the channel is in the middle of the river. Pier head light is on the outer end of the south pier; fixed white, visible 12 miles; 34 feet above lake level, and is built on a wooden tower, painted white. Michigan City Light SW $\frac{1}{2}$ S 36 miles; Kalamazoo Light N by E $\frac{3}{4}$ E 41 miles; Chicago Light W by S $\frac{1}{2}$ S 62 miles; Milwaukee Light NW $\frac{1}{2}$ W 97 miles. Piers run out NW by W $\frac{1}{2}$ W and SE by E $\frac{1}{2}$ E. Depth of water, 17 and 18 to inner end of piers, then 12 to 14 to bridge, thence 11 feet along by the docks. A channel has been dredged through to Benton Harbor, 10 to 11 feet water.

Michigan City,

At the south end of Lake Michigan, Indiana. Light fixed white, visible 13 $\frac{1}{2}$ miles; stands 52 feet above lake level. This is the most southern light on Lake Michigan. New Buffalo NE by E $8\frac{3}{4}$ miles; Chicago Light W by N $\frac{1}{2}$ N 38 miles; Pier head Light, on the outer end of the west pier; fixed red, visible 11 $\frac{1}{2}$ miles; 32 feet above lake level, on a wooden tower; a guide into the harbor. Piers run out N by W $\frac{1}{4}$ and $\frac{1}{8}$ W. A breakwater is being constructed at this Harbor. It commences 220 feet from the lighthouse on the west pier head, running E by N $\frac{1}{2}$ N; 600 feet was finished last fall. The whole length of the breakwater when completed will be 1417 feet, connected at its eastern end by a pile work pier 504 feet, and a bridge pier 722 feet north and south. This work, when finished, will make an excel-

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ocks. Kalamazoo
V 82 miles. Keep

lent outer harbor and be a protection to the main channel. Fourteen
feet water going in. Width of channel, 220 feet.

SAILING DIRECTIONS FOR LAKE MICHIGAN.

(According to the U. S. Survey.)

From Point Betsey to Chicago.

When $4\frac{1}{2}$ miles west of said point steer S by $W\frac{1}{2}W$ $202\frac{1}{2}$ miles,
to a point $2\frac{1}{2}$ miles east of Chicago light.

From Manistee to Green Bay.

When 2 miles west of Manistee light steer N by $W\frac{3}{4}W$ 73 miles,
to a point 2 miles SSE from Pilot Island lighthouse.

From Manistee to Manitowoc.

When 2 miles west of Manistee light, steer W by S 61 miles, to a
point 3 miles east of Manitowoc pier light.

From Grand Haven to Green Bay.

When in range of the two lights and $2\frac{1}{2}$ miles off, steer NNW
40 miles, till Little Point Sauble light bears NE; when steer $N\frac{1}{2}W$
 $116\frac{1}{2}$ miles to a point 2 miles SSE from Pilot Island Light.

From Grand Haven to Milwaukee.

When in range of the lights at Grand Haven and $2\frac{1}{2}$ miles off,
steer $W\frac{1}{4}S$ $77\frac{1}{2}$ miles, to a point 3 miles east of Pierhead Light, at
Milwaukee.

NOTE.—I have never yet, by any compass, been able to run this
course to the westward, $E\frac{1}{4}N$ will take you from Milwaukee to Grand
Haven. Most compasses will deviate on the return course, from half
to three-quarters of a point, consequently you will have to keep to the
southward of the course, $W\frac{1}{4}S$.

From Grand Haven to Chicago.

When in range of the two lights at Grand Haven and $2\frac{1}{2}$ miles
off, steer $SW\frac{1}{2}S$ $103\frac{1}{4}$ miles to a point $2\frac{1}{2}$ miles east of Chicago
light.

NOTE.—This course is also affected the same way.

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Vessels entering
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Light N by $E\frac{3}{4}E$
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This is the most
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iles; 32 feet above
harbor. Piers run
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will make an excel-

From South Haven to Chicago.

When $1\frac{1}{4}$ miles $W\frac{1}{2}N$ from South Haven light, steer SW by $W\frac{1}{2}W$ $73\frac{3}{4}$ miles, to a point $2\frac{1}{2}$ miles east of Chicago light.

From St. Joseph to Chicago.

When $1\frac{1}{2}$ miles NW by W from St. Joseph beacon, steer W by $S\frac{1}{2}S$ $56\frac{1}{4}$ miles, to a point $2\frac{1}{2}$ miles east of Chicago light.

From St. Joseph to Green Bay.

When $1\frac{1}{2}$ miles NW by W from St. Joseph's beacon, steer $N\frac{1}{2}W$ $215\frac{3}{4}$ miles, to a point 2 miles SSE from Pilot Island light.

From Michigan City to Chicago.

When $1\frac{1}{2}$ miles from Michigan City, and in a range of the two lights, steer W by $N\frac{1}{2}N$ for $34\frac{1}{2}$ miles, to a point $2\frac{1}{2}$ miles east of Chicago light.

From Chicago to Green Bay.

When $2\frac{1}{2}$ miles east of Chicago light steer $N\frac{3}{4}E$ $233\frac{1}{4}$ miles, to a point 2 miles SSE from Pilot Island light.

From Milwaukee to St. Joseph.

When 3 miles east from Milwaukee Pierhead light, steer $SE\frac{1}{4}E$ for $91\frac{3}{4}$ miles, to a point NW by W $1\frac{1}{2}$ miles from St. Joseph's beacon.

From Milwaukee to Green Bay.

When 3 miles east of Milwaukee Pierhead light, steer N by $E\frac{1}{2}E$ for $159\frac{1}{2}$ miles, to a point 2 miles SSE from Pilot Island light.

From Milwaukee to the North Manitou Islands.

When 3 miles east of Milwaukee Pierhead light, steer NE by $N\frac{1}{4}N$ for 174 miles, to a point 4 miles from the most northern point of North Manitou Island, and in range with its west side.

From Milwaukee to Manistee.

When 3 miles east of Milwaukee Pierhead light, steer $NE\frac{1}{4}N$ for $111\frac{1}{4}$ miles, to a point 2 miles west of Manistee light.

From Sheboygan to Grand Haven

When $1\frac{3}{4}$ miles east from light on pier, steer SE by E for $8\frac{3}{4}$ miles, to a point $2\frac{1}{2}$ miles off, and in range of the two lights of Grand Haven.

From Cheboygan to Manistee.

When $1\frac{3}{4}$ miles east from light on pier, steer NE by E $\frac{1}{2}$ E for 73 miles, to a point 2 miles west of Manistee light.

From Cheboygan to the North Manitou Islands.

When $1\frac{3}{4}$ miles east from light on pier, steer NE $\frac{1}{2}$ N for 128 miles to a point 4 miles from the most northern point of North Manitou Island, in range with west side. These courses to the North Manitou meet the courses from Waugoshance, as explained in another part of directions for Lighthouses on Lake Michigan.

From Manitowoc to Grand Haven.

When 3 miles east from Manitowoc pierhead light, steer SE $\frac{1}{4}$ S for 96 miles, to a point $2\frac{1}{2}$ miles from, and in range of the two lights at Grand Haven.

From Manitowoc to Chicago.

When 3 miles east from Manitowoc pierhead light, steer due south 153 miles for Chicago.

	Courses.	Miles.
From Chicago to Grosse Point.....	NNW	12
Chicago to Racine.....	N $\frac{1}{2}$ W	57
Chicago to South Manitou Island.....	N by E $\frac{1}{2}$ E	221 $\frac{1}{2}$
Chicago to Grand River.....	NE $\frac{1}{2}$ N	109
Chicago to Kalamazoo River.....	NE $\frac{3}{4}$ E	90
Chicago to St. Joseph.....	E by N $\frac{1}{2}$ N	61
Chicago to New Buffalo.....	E $\frac{3}{4}$ S	45
Chicago to Michigan City.....	E by S	38
Racine to Michigan City.....	SE by S $\frac{1}{4}$ S	82
Milwaukee to Michigan City.....	SE by S $\frac{3}{4}$ S	101
Manitowoc to Michigan City.....	S by E	168
Port Washington to St. Joseph River.....	SE $\frac{3}{4}$ S	109

	Courses.	Miles.
From Sheboygan to St. Joseph River.....	SEbyS $\frac{3}{4}$ S	127
Manitowoc to St. Joseph River	SSE	148
Kewaunee to St. Joseph River.....	SSE $\frac{1}{2}$ S	169
Port Washington to Grand River.....	EbyS $\frac{1}{2}$ S	83
Sheboygan to Grand River.....	SEbyE $\frac{1}{4}$ E	87 $\frac{1}{2}$
Manitowoc to Grand River.....	SE $\frac{1}{4}$ E	100
Kewaunee to Grand River.....	SEbyS $\frac{1}{4}$ S	119
Sheboygan to the South Manitou Island.....	NE $\frac{1}{4}$ N	123
Manitowoc to the South Manitou Island.....	NE $\frac{1}{2}$ E	97 $\frac{1}{2}$
Manitowoc to Grand Point au Sauble.....	E $\frac{1}{2}$ S	55
Death's Door to Grand Point au Sauble.....	SbyE $\frac{1}{2}$ E	90
Death's Door to Manitou Islands.....	SEbyE Ey	48
Bailey's Harbor to South Manitou Island.....	E $\frac{1}{4}$ S	45
Twin Rivers to abreast of Beaver Island, leav- ing the Manitou Islands to the eastward, and the Fox Islands to the westward..	NE $\frac{1}{4}$ E	140
Big Taverse Lighthouse to Rock Island (en- trance to Green Bay, North Channel), leaving the Fox Islands to the northward..	WbyN $\frac{1}{4}$ N	65
Big Traverse to Port Waugoshance.....	NEbyN $\frac{1}{4}$ N	44
Skillegalee to Pine River.....	S $\frac{1}{4}$ W	20
Skillegalee to Point Waugoshance Lighthouse....	S27°W	8 $\frac{1}{2}$

Hog Island Reef.

The range line of the NW and NE points of the Big Beaver Island, runs EbyS, and passes 1 mile to the northward of Hog Island Reef, and about $\frac{1}{2}$ mile to the southward of a small shoal of 6 feet of water, lying $1\frac{2}{3}$ miles south of the SW point of Hog Island, where Hat Island is just shut in by the SE point of Hog Island.

In going from point Waugoshance to Beaver Harbor, the range of the NW and NE points of Big Beaver Island should not be crossed until Hog Island bears north.

From Waugoshance Lighthouse to Sheboygan, Passing North of the Fox Islands, 186 $\frac{1}{8}$ miles, as follows :

Steer SW $\frac{3}{4}$ W 25 miles, then around Beaver Island for 2 miles, till the Lighthouse bears NW; thence steer WbyS $\frac{3}{4}$ S for 19 $\frac{1}{4}$ miles,

Courses.	Miles.
EbyS $\frac{3}{4}$ S	127
.....SSE	148
..SSE $\frac{1}{2}$ S	169
EbyS $\frac{1}{2}$ S	83
EbyE $\frac{1}{4}$ E	87 $\frac{1}{2}$
..SE $\frac{1}{4}$ E	100
EbyS $\frac{1}{4}$ S	119
..NE $\frac{1}{4}$ N	123
NE $\frac{1}{2}$ E	97 $\frac{1}{2}$
.....E $\frac{1}{2}$ S	55
SbyE $\frac{1}{2}$ E	90
EbyE Ey	48
.....E $\frac{1}{4}$ S	45
..NE $\frac{1}{4}$ E	140

till the north point of South Fox bears SE 2 miles distant, when steer SW $\frac{3}{4}$ S 150 miles for Sheboygan.

Dangers to be Avoided.

There are comparatively few shoals and spits in the south end of Lake Michigan, (they are all accurately located on the full U.S. Chart, the south part of which was issued last year), and can easily be avoided by keeping one mile from the shore, with the exception of Racine reef, which is fully explained in the description of that light and harbor. There is an 8 foot shoal half a mile SE from Cheboygan light, near Ulio; there are two 12 feet spots, half a mile distant, in a southerly direction, and a 10 foot spot 500 feet east from the dock; a 10 foot spot lies half a mile east from Fox Point. Half way between Chicago and Calumet lights, are two shoals, 1 $\frac{3}{4}$ miles from the shore, with 14 and 16 feet water on them, and a 10 foot shoal exists 2 miles north from Calumet light, $\frac{3}{4}$ mile from shore, see buoys.

Magnetic Variation on Lake Michigan.

Frankfort.....	4° 17' E.
Big Point au Sauble...	4° 12' E.
Muskegon.....	4° 11' E.
Grand Haven	3° 28' E.
South Haven.....	3° 33' E.
St. Joseph.....	3° 53' E.
Michigan City.....	3° 59' E.
Grosse Point Lighthouse.....	4° 59' E.
Kenosha....	4° 59' E.
Milwaukee.....	6° 22' E.
Sheboygan.....	5° 15' E.
Manitowoc.....	5° 3' E.

Calumet River

Light on the north side of Calumet River, 12 miles SSE of Chicago light, west shore of Lake Michigan, a guide into Calumet River. Is a fixed red light, visible 12 miles, 33 feet above lake level, on an open frame tower, with an elevated walk to the shore. Reef off Calumet has a red third-class iron can buoy on it, and bears as fol-

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lows: Calumet Point bears S 14° W, distant 2,112 yards. Clark's Point bears W by N $\frac{1}{2}$ N, distant 1,230 yards. Piers run out NE by E $\frac{1}{4}$ E, and SW by W $\frac{1}{4}$ W; depth of water going in 11 feet. The inside of the harbor is well piered, and there is a large slip on the port side. To run in open the piers and keep a little nearest the north pier. Depth of water under the breakwater at Chicago, 12 feet all along the inside of breakwater; 100 feet inside of the line of breakwater, from $15\frac{1}{2}$ to 19 feet water. Inside that, and near the center, in line with breakwater, 11, 9, $8\frac{1}{2}$ and $7\frac{1}{2}$ feet.

Grosse Point.

Lake coast light, is fixed white, varied by red flashes, at intervals of three minutes, visible $18\frac{1}{2}$ miles, stands 119 $\frac{1}{2}$ feet above lake level, on a round tower and dwelling of yellow brick, connected by a covered way, is 12 miles north of Chicago. There are two pile piers at this point, called Evanston, the town of which is a very pretty place. The water alongside the piers 10 to 11 feet. Grand Point Au Sauble NNE 153 miles.

Waukegan or Little Fort.

Light on south side of Little Fort River, about 15 miles south of Southport light, Illinois. Is a fixed white light, visible 15 miles, stands 75 feet above lake level, and is on keeper's dwelling. Grosse Point, S by E $\frac{3}{4}$ E 22 miles; Kenosha light NE $\frac{3}{8}$ E $15\frac{1}{2}$ miles.

Kenosha or South Port.

Light on Warrington Island, in Kenosha, Wis., and on the north side of the entrance to the pier harbor. Fixed, varied by white flashes, time between flashes 1 minute 30 seconds; visible $15\frac{1}{2}$ miles, is 76 feet above lake level, tower and dwelling of yellow brick, detached. Kenosha pier-head light, on the outer end of the north pier, fixed red, visible 12 miles, is 39 feet above lake level, on a wooden tower, a guide into the harbor. On entering between the piers, the best water, from 10 to 12 feet, will be found a little to the south of the centre. Racine Light from main light N $\frac{3}{8}$ E 12 miles. Piers run out E $\frac{1}{2}$ N and W $\frac{1}{2}$ S.

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Racine (Root River).

Lighthouse on the north pier, at the harbor of Racine, Wis. Fixed white, visible 13 miles; 48 feet above lake level, is a coast and harbor light, yellow brick rises from back of dwelling. One and three fourths miles $E\frac{1}{4}S$ of this light, is a shoal extending south one mile; least water 8 feet. Milwaukee light NbyW $\frac{1}{2}W$, 22 miles.

Racine Pier-head Light, on the outer end of north pier, at the harbor of Racine. Fixed red, visible 12 miles, 35 $\frac{1}{2}$ feet above lake level, on a wooden tower painted white; forms with the preceding light on the inner part of the pier a range and guide into the harbor. A life saving station is situated on the pier, where the beach outside begins. Buoy off Racine, a first-class iron can buoy, painted red, on the reef outside Racine harbor. This is a rocky shoal. East of Racine least water 8 feet. The shoalest spot on this reef is $E\frac{1}{2}N$ from the old lighthouse 1 $\frac{1}{4}$ miles. Vessels bound into the port of Racine should bring the pierhead light to bear west, and not cross the reef to the southward of that bearing, and in passing to the eastward of the buoy should give it a berth of $\frac{1}{2}$ to $\frac{3}{4}$ of a mile. The channel between the shoal and the city has from 3 to 6 fathoms water, sand and clay bottom. The buoy is placed in 17 feet water, and 1,000 feet to the west of the shoalest spot. This reef extends about one mile N and S, and the same distance east and west. Due east and from the middle of the channel between the piers, will take you clear of this shoal. Light on the north pier, from the buoy WbyN $\frac{1}{2}N$ 1 $\frac{1}{4}$ of a mile. Wind point, N $\frac{3}{4}W$, 3 $\frac{3}{4}$ miles. Piers run out EbyN and WbyS.

NOTE.—Milwaukee Lights are described at the end of the course from the Manitous, also Chicago from Point Betsey. Course from Milwaukee to Grand Haven $E\frac{1}{4}N$ 85 miles.

Port Washington.

Twenty-five miles south of Sheboygan, Wisconsin; is a fixed white light, visible 18 miles, stands 113 feet above lake level, is on keeper's dwelling, of yellow brick. This harbor is under improvement, by building out piers and dredging inside. Seven feet is all that can at present be carried in. When the improvements contemplated are finished, it will be a good harbor for small vessels. Blake's

bridge pier is to the northward of the harbor, where all steamers stop. Twelve to 14 feet water. Sheboygan NbyE $\frac{3}{4}$ E 25 $\frac{1}{2}$ miles; Point Betsey NE $\frac{1}{4}$ N 123 miles.

Sheboygan Pier-head Light.

On the outer end of the north pier, at the entrance to Sheboygan River. Fixed red, visible 12 miles, 32 feet above lake level, on a wooden frame work tower, a guide to vessels entering the harbor. NEbyN, distant 2 $\frac{1}{2}$ miles; from the end of the harbor piers, there is a rocky reef with 8 feet water on it, the north and south ends of which are marked by third class can buoys, painted red, one on each end, 200 feet apart. There is a passage inside the reef which should not be attempted by strangers. Sheboygan light bears from center of reef WNW $\frac{1}{2}$ W about 2 miles.

Sheboygan Main Light.

On a point 2 $\frac{1}{2}$ miles north of the mouth of Sheboygan River. Fixed white, visible 16 miles, 80 feet above lake level, on keeper's dwelling. Twin River Point, NbyE $\frac{3}{4}$ E, 33 miles; Grand Point Au Sauble light EbyN $\frac{1}{4}$ N, 64 miles. Sheboygan harbor piers run out east and west, due east clears the shoal off the north point. Depth of water going in 12 to 14 feet. A life saving station is located in the harbor.

Manitowoc Harbor Lights.

Pier head light on the outer end of the north pier at the harbor entrance. Fixed red, visible 12 miles, 34 feet above lake level, on a wooden frame structure, a guide to vessels entering the harbor. Main light near the inner end of the north pier. Fixed, varied by white flashes, time between flashes 1 minute 30 seconds; 63 feet above lake level; a stone tower, whitewashed, connected with keeper's dwelling by a covered way. Twin River Point, NE $\frac{3}{4}$ E 9 miles; Point Betsey light NEbyE $\frac{1}{4}$ E, 83 miles; Chicago due south. Piers run out E $\frac{1}{2}$ N and W $\frac{1}{2}$ S. Good holding ground outside. Depth of water going in 10 to 12 feet.

Twin River Harbor.

Six and one half miles to the northward and eastward of Manitowoc, has two harbor piers, and is under improvement. There are

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only 7 feet water at present, but it will be dredged to 12 feet this season. The corner on the inner end of the west pier is to be taken away so that boats can wind round, and eventually will be a good harbor. There are two bridge pier docks outside to the west of the harbor, with 12 to 14 feet water alongside. A life saving station is in the harbor.

Twin River Point Light.

About 5 miles north from Twin River harbor is fixed, varied by white flashes, time between flashes thirty seconds; stands 110 feet above lake level, visible 18 miles, on a brick tower, connected with keeper's dwelling by a covered way also of brick, on a low sandy point; pine barrens to the north, south, and west. Manitowoc Light S 45° W, 12 miles. Grand Point au Sauble Light E by S 1/4 S 50 miles, both structures are whitewashed, dome of lantern painted black. Look out for trap-nets all around this point and in the neighborhood of Twin Rivers, in 3 1/2 fathoms water.

Bailey's Harbor

Range lights, both fixed white, visible 8 and 12 miles, rear light on keeper's frame dwelling, front light on wooden tower; these lights are 1,000 feet apart, a guide to the anchorage in Bailey's harbor, 10 miles N by E 1/2 E from Cave point. Sleeping Bear Point E by S 53 miles. To run in bring the lights in range, bearing NNW 1/2 W, and stand into the bay. The old white tower of the former light on the point on the starboard side of the entrance, is still standing and serves as a good day mark for approaching the harbor; good holding ground two cables lengths west of the old tower, in 6 fathoms water. When past the reef or middle ground, on the port hand, you can run to the lime dock or to the upper wood dock or come to anchor in the bay on the east side.

Mud Bay.

Two miles north of Bailey's harbor is a good shelter from SE and NW winds. The soundings are gradual, from 7 to 2 fathoms; to run in, open the bay when in 6 or 7 fathoms water, steer up the middle of the Bay, and come to anchor on the south side.

Cana Island Light.

On Cana Island 15 miles SSW of the south entrance to Green Bay, and 4 miles to the northward of Bailey's harbor; fixed white light, visible 16 miles, 88 feet above lake level, tower and dwelling of yellow brick connected by a covered way, and is a coast light. South Fox Island light E by $N\frac{3}{4}$ N, 62 miles. South point of South Manitou Island E $\frac{3}{4}$ S, 45 miles.

North Bay Buoys.

Two buoys, No. 1 black, No. 2 red, 20 foot spar buoys. These buoys mark the entrance into North Bay, Lake Michigan. On entering the bay keep midway between the buoys, and double around under either point, according to the direction of the wind. There is a sandy flat setting to the eastward from the centre of the bay, which must be avoided by coming to under either of the above points in 3 fathoms water, or run in for the centre and come to. From No. 1 buoy, Cana Island Lighthouse bears $S\frac{3}{4}$ E, distant 3 miles. The wood dock on north side of bay N by $W\frac{1}{2}$ W; northeast point of North Bay, NE by $N\frac{3}{4}$ N. Buoy No. 2, Cana Island Lighthouse bears $S\frac{3}{4}$ E three miles. Fish house and dock on south side of bay, SW $\frac{1}{2}$ S; northeast point of North Bay, NE $\frac{1}{4}$ N.

Rowley's Bay or False Door.

From Cana Island, bearing west $1\frac{3}{4}$ miles, steer $N\frac{1}{2}$ W, leaving North Bay to port, after passing which the depth of water is from 8 to 5 fathoms. Keep on up the bay on the same course till Spider Island bears east, when you will drop into 4 fathoms; thence to the dock by the lead.

Outer Shoal between Gravel and Spider Islands.

Has a red third class iron can buoy. This buoy marks the outer shoal, on which there is 15 feet water. Vessels bound into Green Bay, through Death's door, by bringing this buoy to bear west, distant one half mile, the course will be NNW, until the black buoy on the 9 foot shoal is abeam; thence NW $\frac{1}{2}$ N will carry you through the passage and into the bay. Port DuMort Lighthouse $N\frac{1}{2}$ E, $3\frac{1}{4}$

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miles. Spider Island SW $\frac{1}{8}$ W, $2\frac{7}{8}$ miles. Gravel Island NW $\frac{1}{4}$ W, $1\frac{1}{8}$ of a mile from buoy.

Port DuMort, Pilot Island.

Lighthouse in the southern entrance to Green Bay, flashes white, time between flashes one minute; visible 12 miles, stands 38 feet above lake level; has a first class syren, giving blasts of five seconds, at intervals of thirty seconds; yellow brick building. To enter Port DuMort from Lake Michigan, bring the light at five miles distance, in 19 or 20 fathom water, to bear from NW by W to NNW $\frac{1}{2}$ W, and steer for it till the light bears north, $1\frac{1}{2}$ miles distant; thence NW $\frac{1}{8}$ W 5 miles into Green Bay. This course will pass south of Plum Island. There is a good channel between Pilot Island and Detroit Island; also a good channel between Plum Island and Detroit Island, not safe for strangers. The northeast shores of the Peninsular of Green Bay and Washington Island are fringed with rocky shoals, requiring a vigilant look-out and use of the lead. From Pilot Island after clearing the channel to Chicago, the course is S $\frac{1}{2}$ W 245 miles.

Port DuMort Passage

Nine foot shoal, has a third class iron can buoy, black. This buoy is on the southeast end of the 9 foot shoal, near the middle of the passage of Port DuMort; vessels from the eastward bound through this passage, when the buoy is abeam, can steer NW $\frac{1}{2}$ N into the bay. Bearings of buoy, Pilot Island Lighthouse NE by E, $1\frac{3}{4}$ miles; west point of Plum Island, N $\frac{1}{2}$ W 2 miles; red can buoy on outer shoal between Gravel and Spider Island, SSE $2\frac{3}{4}$ miles.



der Islands.

buoy marks the outer bound into Green Bay to bear west, until the black buoy carry you through Lighthouse N $\frac{1}{2}$ E, $3\frac{1}{4}$

Green Bay.

From Boyer's Bluff to Eagle Bluff.

SW $\frac{1}{2}$ S, 22 $\frac{1}{4}$ miles. This course leaves the door passage to the southward, 5 miles. The Sister Islands to port and also the Sister Shoals, 1 $\frac{1}{2}$ miles off, and the Horseshoe reef to starboard $\frac{1}{2}$ miles. Horseshoe reef has a second class iron can buoy on it, painted black. This buoy is placed on the south side of the reef, in 3 fathoms water. Vessels should not approach this buoy from the northward, nearer than 1 $\frac{1}{2}$ miles, as there is a rock with 6 feet water NE by E, off northern end of the shoal. Bearings of buoy, north point of Chambers Island W $\frac{3}{4}$ S, 6 miles; west side of Horseshoe Island, south, 2 $\frac{5}{8}$ of a mile; Eagle Bluff Light S by W $\frac{7}{8}$ W, 3 $\frac{3}{8}$ miles; centre of Whales Back reef, N $\frac{1}{2}$ E, 9 $\frac{1}{2}$ miles; Sister Islands E $\frac{1}{2}$ N, 3 miles.

Eagle Bluff Lighthouse.

Two miles north of Fish Creek, in Green Bay. A fixed white light, visible 15 miles; 76 feet above lake level, and is a guide through the Strawberry Island passage, between the islands and the main shore. Tower rises from the corner of keeper's dwelling, built of yellow brick. There is a good passage between the Strawberry Islands and Chambers Island, not safe for strangers. Horseshoe reef bears N by E $\frac{1}{4}$ E 3 $\frac{1}{2}$ miles. Eagle Harbor, to the northward of the bluff, is a good harbor of refuge between the island and the main land, in 5 to 7 fathoms water.

From Eagle Bluff to Entrance of Fox River, or Tail Point.

From Eagle Bluff follow the main shore close along, steering S by W $\frac{1}{4}$ W for 5 $\frac{1}{2}$ miles, till Hat Island bears west, when steer SW 49 miles to Tail Point Lighthouse, bearing NW by N in 3 $\frac{1}{2}$ fathoms water.

Long Tail Point Light,

Near the mouth of Fox River, at the head of Green Bay. Fixed white, visible 14 miles; 56 feet above lake level, on keeper's dwelling, built of wood; a guide to the entrance of Fox River, Green Bay City.

Buoys to Mark the Channel into Green Bay.

Long Tail Point Buoy No. 2, red, second class iron can buoy. This buoy marks the end of the shoal off Long Tail Point. Vessels bound to Green Bay City can steer for it, passing it close to on the starboard hand, it being in 16 feet water.

Point Au Sable Buoy.

No. 1, black, a spar buoy. After hauling round the black buoy, you make the first red buoy. No. 4, a 12 foot spar buoy, marks the entrance into the new cut. Point Au Sable, bearing $E\frac{1}{2}N$ 4 miles, and Tail Point Lighthouse N by E $2\frac{3}{4}$ miles.

The New Cut range lights. Grassy Island upper light fixed white, visible 13 miles; 37 feet above lake level. Grassy Island lower light, fixed white, visible 11 miles; 30 feet above lake level. This cut is pierced, and the lights are at each end of the pier, on the port side going in. Wooden towers, 676 feet apart; keeper's dwelling between the two towers; lights the artificial cut into Fox River, Wisconsin.

Buoys from Range Lights into Fox River.

Second buoy, red, 12 foot spar buoy, No. 6, in 12 feet water.
Third buoy, red, 12 foot spar buoy, No. 8, in 12 feet water.
Fourth buoy, red, 12 foot spar buoy, No. 10, in 12 feet water.
Fifth buoy, red, 12 foot spar buoy, No. 12, in 12 feet water.
Channel Bank, red, 12 foot spar buoy, No. 14, in 12 feet water.
Channel Bank, red, 12 foot spar buoy, No. 16, in $10\frac{1}{2}$ feet water.
Red to starboard and black to port going in.

NOTE.—The directions for this and other harbors will follow after the lighthouses in Green Bay.

From Long Tail Point Lighthouse, bearing NW one mile, steer NE $\frac{1}{4}N$ $39\frac{3}{4}$ miles till Green Island Lighthouse bears NW $2\frac{1}{2}$ miles; thence N by E $11\frac{3}{4}$ miles till the NW point of Chambers Island bears east

1 $\frac{3}{4}$ miles; thence NE by N $\frac{1}{4}$ N for 37 $\frac{1}{2}$ miles to Peninsular Point Lighthouse, distant 2 $\frac{3}{4}$ miles; thence north 5 $\frac{1}{2}$ miles in middle of bay, to $\frac{3}{4}$ mile east of Escanaba.

Green Island Light on Green Island.

On the Southeast point of the same, off Menomonee River, Green Bay; is a fixed white light, visible 14 miles; 55 feet above lake level; on keeper's dwelling; built of brick. Reefs extend off from the SE and NW points of this island a half and one mile respectively. The best channel, six miles wide, is to the eastward of this island. The northwest end of Chambers Island bears NE by N $\frac{1}{2}$ N 11 miles. The southeast point of Peshtigo Shoal, SW by S 8 miles, and when these two islands are just open with each other, you are clear of Peshtigo Shoal. Sturgeon Bay S by E $\frac{3}{4}$ E 11 miles; Egg Harbor E $\frac{1}{4}$ S 9 $\frac{3}{4}$ miles. Eagle Bluff Lighthouse NE by E $\frac{1}{4}$ E, 14 $\frac{1}{2}$ miles.

Menomonee River Lighthouse.

Near the outer end of North Pier, at Menomonee River, being built. The piers run out NE by E $\frac{1}{8}$ E.

Chambers' Island Light.

On the NW end of Chambers' Island, Green Bay. Is fixed, varied by white flashes; time between flashes one minute, visible 15 miles, 68 feet above lake level. Tower rises from the corner of keeper's dwelling, built of yellow brick. A guide through the western passage 5 $\frac{1}{2}$ miles wide between the island and the main land. A reef extends off the north point of the island, 1 $\frac{1}{2}$ miles; strangers should not pass to the eastward of this island, or between it and the Strawberries; Whale's Back Shoal bears NE $\frac{1}{2}$ N, 14 miles; Point Rochereau, NNW $\frac{3}{4}$ W, 7 miles; Menomonee SW by W, 13 miles.

Whale's Back Shoal.

The Whale's Back Shoal is indicated by piles with brush on top. It bears from Boyer's Bluff E by N $\frac{3}{4}$ N 12 $\frac{1}{4}$ miles. Little Door Bluff SE $\frac{7}{8}$ E 7 $\frac{3}{8}$ miles.

Mouth of Cedar River, west shore of Green Bay, WNW 8 $\frac{1}{2}$ miles. Off from the west end of Whale's Back Shoal, bearing NE 500

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yards, there is a spot of boulders, with 10 feet water. The soundings in proximity to the Whale's Back Shoal, are irregular, the bottom stone, sand and gravel. Within 700 feet of the main shoal there is from 6 to 21 fathoms water. Whale's Back is composed of two shoals, 1400 yards in extent east and west, and 400 feet north and south; the least water 4 feet.

Peshtigo Point Shoal

Is indicated by piles with brush on top, on the south end of the sand flat, extending SE $3\frac{1}{4}$ miles from Peshtigo Point. Least water, six feet. Bearings, entrance to Peshtigo River NWbyW $\frac{1}{4}W$ 4 miles; Oconto Shoal SWbyW 12 miles; entrance of Little Sturgeon Bay SbyE 15 miles.

Pensaukee Shoal.

A 12 foot spar buoy, red. This buoy is placed on the south end of the shoal, which extends ESE $3\frac{3}{8}$ miles, to the mouth of the river. Least water, 5 feet. Bearings: The Oconto Shoal NEbyN 3 miles; village of Pensaukee WNW $4\frac{1}{2}$ miles; Long Tail Point Lighthouse SWbyS $\frac{1}{2}S$ 16 miles; entrance to Red River on the east side of Green Bay, SE $\frac{1}{2}S$ 8 miles.

Sturgeon Bay Buoys,

On the east side of Green Bay. Two black buoys off Hill's Point. These buoys mark the shoal off Hill's Point, 12 foot spar buoys, in 10 feet water.

NW end of middle ground, black buoy, in 9 feet water. This buoy is on the north end of middle ground; 12 foot spar buoy, south end of north middle ground, black buoy, in 9 feet water. This buoy marks the south end of middle ground, in 9 feet water. North end of south middle ground, black buoy, This buoy marks the south middle ground. East end of south middle ground, red buoy, a 12 foot spar buoy. This buoy is on the east end of middle ground. From ENE shore to channel bank, 160 yards. Width of channel to red buoy, 300 yards.

From Washington Harbor to Long Tail Point Lighthouse, by the Strawberry Island Channel.

Run out of the harbor close round Boyer's Bluff, which is very bold, and at a distance of $\frac{3}{4}$ of a mile; steer SWbyS 29 miles to

abreast of the point beyond Horse Shoe Island, called Eagle Bluff Point, where a lighthouse has been erected, and shows a bright white light, leaving Plum Island to port in the distance, and the Door Bluff (which is high and deep close to) on the peninsula to port; and as you approach the next high bluff, called the Sister Bluff, you will make two small islands called the Sisters, which you also leave to port, at a distance of $1\frac{1}{2}$ miles, and notice that there is a reef, with two detached shoals, $\frac{3}{8}$ of a mile apart, on the same range, which bears from these islands SWbyS $\frac{1}{2}$ S $2\frac{1}{2}$ miles, with $6\frac{1}{2}$ feet water on them. You can run all round them in from 40 to 50 feet water. After passing these islands, keep Horse Shoe Island just open with the next bluff point above it, Fish Creek Bluff, which is 3 miles beyond Eagle Bluff; or in the night, run for the light, keeping it a little on the port bow, leaving a patch of rocks called the Pancake Shoal to starboard, which shoal bears from Horse Shoe Island N $\frac{1}{2}$ W about $2\frac{1}{4}$ miles. After passing Horse Shoe Island, keep the east shore well aboard, until past the Strawberry Islands and abreast of Hat Island; then shape your course SW 55 miles, to Long Tail Point, or run the shore along from point to point, at a distance of 2 miles, and note that there is a patch of rocks about 7 or 8 miles from Hat Island, and $1\frac{1}{4}$ miles from the shore, called Horse Shoe Bay Reef, and $5\frac{1}{2}$ miles from Egg Harbor.

Horse Shoe Island and Eagle Harbor.

To go into this harbor, follow the island close round, and haul in and make fast to the trees, as the water is very deep close in. When in this harbor you are perfectly land-locked. There is a good wood dock to the southward and eastward of Horse Shoe Island in the bay, and is always supplied with wood of the best quality. The depth of water between Horse Shoe Island and the mainland is from 6 to 10 fathoms, sandy clay bottom.

Fish Creek is 3 miles from the first point above Horse Shoe Island, and is a good harbor. You can carry from 2 to 3 fathoms water, clay bottom; about one cable's length beyond the dock, there is a spit that sets off from the point on the same side as the dock in going in, which is plainly shown in clear weather.

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Egg Harbor has a good wood dock, with 14 feet water alongside; is on the east side of the bay, and runs out west, with an angle north and south from it, to the southward. Wood of the best quality. This bay is large and commodious, with good holding ground in from 3 to 7 and 8 fathoms, clay bottom.

Hat Island is directly opposite Egg Harbor, and bears from the dock NW by N $\frac{1}{2}$ N, and is just open with the SW end of Chamber's Island.

Big Sturgeon Bay.

In running up Green Bay, after leaving Hat Island, east channel, run the shore along at a distance of 2 miles; cross Sturgeon Bay, keeping the south shore well aboard, or when Green Island bears NW by N $\frac{1}{2}$ N, run in SE by S $\frac{1}{2}$ S, until Bradley's Dock is abeam; then haul over for the dock. From Bradley's Dock to Graham's Dock, run the shore along in from 12 to 15 feet water.

To Enter Little Sturgeon Bay.

Run for the south bluff at the entrance to the bay, keeping it well aboard, in 3 to 4 fathoms water; you will carry that water until well up to the saw mill.

The new channel across Grassy Island, leading to Fox River is 200 feet wide, and 14 feet deep; from end to end, about a mile and a half. It will save from 3 to 4 miles of sailing over the old route, round the east end of Grassy Island, besides the great advantage of permitting vessels to come in with a wind that would allow them to head up SSW or NNE.

The new channel leaves the old one near the second stake below the mouth of the river, and runs straight in a line about NNE, pointing to the black stake on Sauble Point. Steamers and vessels will be able to run up or down in the night.

Big Bay de Noc.

From Louse or Rock Island Lighthouse to Big Bluff N by E $\frac{1}{2}$ E 20 miles; thence NE by N $\frac{1}{2}$ N $8\frac{1}{4}$ miles to Garden Bluff; thence NNW $\frac{1}{4}$ W 4 miles, to Holbrook & Elkin's mills; come to in 12 to 13 feet water. There is excellent holding ground in the bay to the northward of the Big Bluff, in from 6 to 7 fathoms water, mud bottom.

From Death's Door, after entering this channel, and past Plum Island, run the shore of Washington Island along at about 1 mile distant, or $N\frac{1}{4}E$ 8 miles to abreast of Boyer's Bluff; thence $NE\frac{1}{2}N$ 24 miles, to Big Bluff; thence $NE\frac{3}{4}N$ 8 miles, to Garden Bluff; thence $NNW\frac{1}{4}W$ 4 miles, to the mill at Sturgeon River. There is a buoy kept off the mouth of the river as a mark for vessels to load by.

From the NW end of St. Martin's, after passing through the channel, steer $NbyE\frac{1}{2}E$ to Big Bluff, 12 miles. There is a good harbor on the NE end of Big Summer's Island, with a good protection from all winds except NE. Come to in the centre of the harbor in 5 to 7 fathoms water, opposite the fishing houses.

Sag Harbor.

Sag Harbor is a small bay on the south side of Big or Burnt Bluff, about 3 miles from it. It is formed by a sand bar running in a line with the shore. To run in, haul round the bar by the lead and come to in the bay; there is only 6 feet water going in.

Ogontz Bay.

This bay is formed by Round Island, Isle St. Videl, and a long shoal which sets down from Indian Point, and Sturgeon River, and terminates with three patches of rock, which bear from Middle Bluff $NWbyW\frac{1}{2}W$ $3\frac{1}{2}$ miles, with 6 to 7 feet water on them. This shoal can be followed close round, in 4 fathoms, from Sturgeon River to the head of Ogontz Bay, and when abreast of Isle St. Videl the soundings will decrease gradually from 3 to 2 fathoms. In returning from Ogontz Bay bound to Point Peninsular, run down the bay $SbyW\frac{1}{2}W$ until past Round Island; then haul up $SWbyW\frac{1}{4}W$ 13 miles, giving Round Island a berth of $\frac{3}{4}$ of a mile. Pass round Point Peninsular at a distance of $1\frac{1}{2}$ miles to clear the shoals off from it. The soundings are very gradual from Round Island to the Point in $3\frac{1}{2}$ to 4 fathoms water, and at the head of Big Bay de Noc and Garden Bay soundings are very gradual from $4\frac{1}{2}$ fathoms to within $\frac{3}{4}$ of a mile of the beach.

There is a shoal sets off from Stony Point, which is a point of low land, east of Sturgeon River $1\frac{1}{2}$ miles, and also a shoal off the next low point north of it $\frac{3}{4}$ of a mile.

There is a remarkable sand bluff called Jack's Bluff on the east side, at the head of the bay. It can be seen from Big Bluff, and is a good leading mark for the head of the bay.

There is excellent holding ground under Garden Bluff, and a good harbor can be made under Middle Bluff, and the island north of it, in $4\frac{1}{2}$ fathoms, soft bottom. You can run into this harbor from the northward, leaving the island to starboard, in 3 fathoms (sandy) until you drop into soft bottom.

To go in from the southward, haul in close around the bluff and into the bay, leaving the island to port.

Snail Shell Harbor.

This harbor lays to the southward of Middle Bluff, and is perfectly land-locked. The water is very deep. Vessels or boats make fast to the trees, or lay alongside the beach, which is steep. It is not so good a harbor for vessels as steamers, as the entrance is open to the northward. Big or Burnt Bluff has good anchorage in 5 to 7 fathoms, soft bottom, on the north side, in the bay. Vessels can ride out any gale here. Height of Big Bluff, 227 feet from water level. Course from Big Bluff to Isle St. Videl, NbyW $\frac{1}{2}$ W 4 miles; from Point Peninsular to Boyer's Bluff, S $\frac{1}{2}$ E 18 miles; from the station on Big Bluff to Boyer's Bluff, S 26° W. The Door Bluff shows out a little to the westward of Boyer's Bluff on the range.

NOTE.—There is a lighthouse on Point Peninsular, and a beacon light on Sand Point, in Little Bay de Noc.

As the railroad to Marquette is now in operation, masters of vessels will find it to their advantage to run through the north passages, especially coming from the lower lakes. The passage north of the Beaver Islands, in connection with them, will shorten the route materially, and is preferable to the south passage. High Island gives a good lea with a southerly wind in the north passage. A lea can be made from a south wind under Gull Island, Front Island and Whisky Island, but the ground is not so good as under High Island. The best anchorage is under the east point of the island, in 5 to 7 fathoms, sandy clay. When laying here, should the wind chop round to the NW, you can run out, round the east end of the island, giving the

point a good berth, and follow the island close round and come out to the westward, leaving Gull Island to port or to starboard pretty close to. The course from the south side of Gull Island to Rock Island Lighthouse is WSW, but if the wind should be southerly you will have to haul up a point higher, as a southerly wind always sets a stiff current through the passages and along the islands leading into Green Bay.

St. Martin's Island Channel.

In going through this channel, leave the Gull Islands to starboard and St. Martin's Island to port; run through about mid-channel, and when abreast of the west end of St. Martin's, steer $NW\frac{1}{4}W$ 15 miles for Point Peninsular; thence NNW 6 miles to Sand Point, Little Bay de Noc, giving the point a berth of $\frac{1}{2}$ a mile, and haul round to the docks or come to anchor in 7 fathoms. In passing Peninsular Point, give it a berth of $1\frac{1}{2}$ miles, to clear the shoal that sets down from it $S\frac{1}{2}E$. There is a detached shoal to the eastward of the point about $\frac{3}{4}$ of a mile, with 8 feet water on it. A very good harbor can be made from S to E and NE winds on the west side of Point Peninsular, in 5 to 6 fathoms water, soft bottom, with the point bearing ESE.

NOTE.—The shore is bold on the north and west sides of St. Martin's Island, and the channel is deep; from 13 to 20 fathoms. From the SE point of the island for 2 miles, you will find 6 to 7 fathoms water, hard bottom.

There is a detached shoal off the SE end of St. Martin's Island bearing SbyW $2\frac{1}{2}$ miles distant, which has 8 to 12 feet water on it.

One cable's length from this shoal you will find from 5 to 7 fathoms water, and will carry that water a long distance to the northward.

From Plum Island to Sand Point, Little Bay de Noc.

From Plum Island to a point 3 miles west of Point Peninsular, and in mid-channel, steer $N\frac{1}{2}W$ 27 miles; thence same course 6 miles to Sand Point.

From Boyer's Bluff to Sand Point $N\frac{3}{4}W$ 24 miles. From Rock Island Lighthouse to Sand Point NNW 25 miles.

From Green Island to a point 3 miles west of Point Peninsular NNE $\frac{1}{2}$ E 49 miles; thence N $\frac{1}{2}$ W 6 miles to Sand Point. This course brings you close to Chamber's Island.

From the anchorage off Menomonee River to a point 3 miles west of Point Peninsular, NE $\frac{3}{4}$ N 49 $\frac{1}{4}$ miles.

Poverty Island Channel.

There is a good deep channel on both sides of Poverty Island. To enter the south channel keep midway between Poverty and Gull Islands, and after passing Poverty Island haul up for Little Rock Island, keeping Big or Burnt Bluff closed in behind Little Rock Island. On this route you will pass over a shoal with 4 to 5 fathoms water on it. There are several patches of shoal water lying between this shoal and the North Gull or Gravelly Island, so that by keeping well to the northward you avoid all danger.

A lighthouse is erected on Poverty Island as a guide for these channels.

To enter Green Bay by the north channel, open Poverty with Big Summer's Island, and run straight in, keeping Poverty best aboard; thence for Little Rock Island, giving it a berth of $\frac{3}{4}$ of a mile to starboard.

The channel between Point Detour and Big Summer's Island is difficult to run, being crooked and shallow, and requires a good pilot, the depth of water being only 10 to 12 feet, and rocky.

From Bailey's Harbor to Pilot Island Lighthouse, 18 miles NNE.

NOTE.— At the commencement of a SE wind blowing fresh, there is always a strong current setting into Green Bay, down along the west shore and among the Beaver Islands.

Good anchorage under the south side of Chamber's Island, in 4 to 5 fathoms water, sandy clay bottom.

From Waugoshance Lighthouse to Chicago.

Steer SW $\frac{1}{2}$ S for 97 $\frac{1}{2}$ miles, till Point Betsey Lighthouse bears east; thence for Chicago, S by W $\frac{1}{2}$ W 209 miles.

The lighthouses at Waugoshance and Skillegalee are 8 $\frac{1}{2}$ miles apart; and the range line of the two, as referred to the true meridian

at Waugoshance, being just S 27° W, a good opportunity is afforded to masters of vessels to test the working of their compasses by dropping upon this range, either to the SW by $3\frac{1}{4}$ S of Skillegalee about 2 miles, or to the NE by $N\frac{1}{2}$ N of Waugoshance Lighthouse about the same distance, and sailing upon the range $\frac{1}{2}$ a mile or so, keeping the lighthouses covered in both cases.

The White Shoals bear from Point Waugoshance Lighthouse NW $\frac{1}{4}$ W $4\frac{1}{4}$ miles. You can pass all round them in 20 to 30 feet water. They can be plainly seen in clear weather.

Simmon's Reef bears from Point Waugoshance Lighthouse NW by N $10\frac{3}{4}$ miles; is $1\frac{1}{4}$ miles long, east and west. You can pass round it, from 18 to 24 feet water, and can be seen quite plain in clear weather. It bears from the White Shoals NW by $N\frac{1}{2}$ N $5\frac{1}{4}$ miles, and from the NW end of St. Helena W by N $17\frac{3}{4}$ miles.

The Indian Payment Shoal bears from Simmon's Reef NE by E $\frac{1}{2}$ E $7\frac{3}{4}$ miles, and from the NW end of St. Helena NW $\frac{3}{4}$ W $11\frac{3}{4}$ miles. It has from 5 to 11 feet water upon it, and can be passed all round in from 21 to 40 feet water.

The shoal off the NW end of St. Helena bears due west from the island 2 miles, and can be passed on either side in from 25 to 30 feet of water. This shoal has from 8 to 15 feet of water on it.

Gray's Reefs bear from Point Waugoshance Lighthouse west 6 miles. There are 13 patches in all, only one of which has less than 16 feet of water, and that one is near the centre

DIRECTIONS FOR SAILING NORTH OF THE BEAVER ISLANDS.

From Mackinaw to Seul Choix Point.

From the middle of Mackinaw Harbor WSW $4\frac{1}{2}$ miles, or until you range the Rabbit's Back Point with Point St. Ignace; thence W $\frac{1}{2}$ N to Seul Choix Point.

This route passes $1\frac{1}{2}$ miles to the northward of Point Waugoshance Lighthouse, and $1\frac{1}{2}$ miles to the north of the White Shoals.

Seul Choix Point bears from Gull Island, which is the westernmost island of the Beaver group, NbyW $\frac{1}{4}$ W 16 miles. The water is deep close to this point. You can approach the point in from 30 to 55 feet water. Rocky bottom.

From Seul Choix Point to Hat Island, Thirty Miles, as Follows.

From Seul Choix Point EbyS $\frac{1}{4}$ S 30 miles; thence on the same course 10 miles, to Point Waugoshance Lighthouse.

This route passes 2 $\frac{1}{2}$ miles south of the White Shoals, and $\frac{1}{4}$ miles north of Gray's Reefs.

From St. Helena Island to Abreast of the Manitous, North About, and to Chicago, 322 Miles.

From St. Helena, after clearing the shoal which is due west from the island 2 miles, steer due west 40 miles; thence SW $\frac{1}{4}$ W 16 miles; thence SbyW $\frac{1}{2}$ W, for Chicago, 273 miles.

This route is only 9 miles further than the Sheboygan route, and is far more preferable in the fall of the year. A vessel or propeller, by keeping the west shore aboard, can go with a NW and westerly wind in smooth water, and make her passage with ease; and in case of being driven down in thick weather to the northward and westward of the Beaver Island group, this route will be found convenient for making the Straits, by keeping to the northward of them all, and come in to the eastward.

Gull Island Shoal bears from Gull Island SbyE $\frac{1}{2}$ E, from High Island SWbyW, and from the SW point of Beaver Island WNW.

There are two patches of shoal water a little to the southward and eastward of Gull Island Shoal, with 16 and 17 feet water on them. This reef is about 4 $\frac{1}{2}$ to 5 miles from Gull Island. Between Gull Island and High Island the water is deep, being from 22 to 168 feet, from shore to shore, and is nearly 6 miles wide. Due north carries you through midway. The water between High Island and the Big Beaver is deep, being from 36 to 138 feet. To run through this channel, keep about midway until you are abreast of Trout Island, steering NNE. This course will carry you clear through, leaving Whisky

Island and the shoal which sets off from it SW to port, best aboard, but is only safe for small vessels, as there are a number of patches of rock and sand with from 7 to 13 and 17 feet of water on them; but in case a vessel should get in here in foggy weather, when you are abreast of the NW point of the Big Beaver, haul out NW until Trout Island bears SSW, then haul up NNE, leaving Whisky Island and Squaw Island 2 miles to starboard, until Seul Choix Point bears $W\frac{3}{4}N$; thence as above to Mackinaw.

Potter's Reef bears from Point Patterson $EbyN\frac{3}{4}N$ $6\frac{3}{4}$ miles, and is nearly in range with point Patterson and Seul Choix Point.

The distance from Squaw Island (which is the most northern island of the Beaver group) to Point Patterson is $9\frac{1}{4}$ miles, and Seul Choix Point is $14\frac{1}{2}$ miles from Trout Island, and 16 miles from Gull Island, leaving a deep channel of from 30 to 180 feet water.

From Beaver Harbor to Point Waugoshance Lighthouse, Twenty Miles and a Half.

From the south dock at the entrance of Beaver Harbor east 8 miles, to a point $\frac{3}{4}$ mile north of Hog Island Reef; thence $EbyN\frac{1}{4}N$ $12\frac{1}{2}$ miles, to the passage $\frac{1}{4}$ mile south of Waugoshance Lighthouse, observing that Hog Island Reef lies in the range of Whisky Island and the south point of Garden Island; a range easily recognized, and which will serve to indicate the vicinity of this dangerous reef.

From Waugoshance Lighthouse to Northport and Traverse City, in Traverse Bay.

Steer $SW\frac{1}{2}S$ $9\frac{3}{4}$ miles till Skillealee Lighthouse bears east; thence SSW $41\frac{1}{2}$ miles, till Northport Point bears NW, when run for the dock. In going in and going out, look out for the shoals in the northern part of the bay. To make Traverse City when SE of Northport Point, as above, steer $SbyW$ $24\frac{3}{4}$ miles, to the dock at Traverse City.

From Waugoshance Lighthouse to the Village of Little Traverse.

Steer $SW\frac{1}{2}S$ for 2 miles, thence $S\frac{1}{2}W$ 14 miles, till Middle Village bears east, giving Skillealee or Isle Aux Gallets Lighthouse, a

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good berth, then follow the coast at the distance of $\frac{3}{4}$ mile off for 15 miles, till the harbor of Little Traverse is made.

NOTE.—The above courses are true, and the distances are in statute miles.

HARBORS AND ANCHORAGES.

Little Traverse

Is an excellent harbor, affording protection in all winds, with good holding ground. In Traverse Bay, the harbors of Northport, New Mission Point, Sutton's Bay, Bower's Harbor, and Old Mission Bay, are all good harbors.

Cat-Head Point and Bay

Afford shelter in southerly winds. Very good holding ground is found under Pyramid Point. Also, Unity Dock affords protection in all winds except N and NE.

Glen Harbor

In the Bay, between Sleeping Bear Point and Pyramid Point, has good shelter from all winds from the west, round by the south to northeast.

A Lee

Can be made under the North Manitou, with generally good holding ground.

The Holding Ground Around the Foxes

Is very good, and they afford shelter from all winds, except those from the NW and SE.

In Going Into Little Traverse Bay,

You will make a sandy point which forms the harbor, haul close round it and into the bay, and come to in from 2 to 9 fathoms water. Off the point which forms the harbor, you will have from 10 to 17 fathoms water close to. The village cannot be seen until you are nearly up to the point. This bay is one of the prettiest harbors on all the lakes.

Petosky

Is directly opposite Little Traverse Bay. Is a railroad terminus, and has good dock, with 12 to 14 feet water.

North Manitou Island

Has two wood docks, one on each side of the island; and good holding ground can be found on the east side of the island, near the dock, in from 6 to 10 fathoms. Pickard & Co. have a saw mill here.

South Manitou Island

Has a wood dock in the bay. Good holding ground in the bay, with the dock bearing NWbyW, in from 7 to 12 fathoms. The dock runs out EbyS $\frac{1}{4}$ S. The SE point of the North Manitou Island bears from the dock E $\frac{1}{2}$ N 6 $\frac{1}{2}$ miles, and the lighthouse bears from the dock SEbyS $\frac{1}{2}$ S 2 miles.

There is also a dock at the North Unity Bay, opposite the Manitou Islands.

DANGERS.

From Middle Village to the Foot of the East Arm of Grand Traverse Bay.

The coast, as far as Little Traverse, can be approached within $\frac{1}{2}$ a mile. There are detached rocks and rocky spots within $\frac{1}{3}$ of a mile from the shore. A 12 feet spit extends 600 feet SbyE from the dock at Little Traverse. There is also a 9 feet spot 1,000 feet south of the most eastern house of this village.

From Little Traverse to Big Rock Point.

The coast can be approached safely within $\frac{1}{4}$ of a mile, the shallow water being in the indentations of the shore. From Pine River Point, a rocky flat extends $\frac{1}{4}$ of a mile to the west and north.

Dangerous Reefs

extend to NE and NW for almost a mile from Fisherman's Island. From this island to the foot of the east arm of the bay are many detached rocky spots and ledges, and numerous spits, extending from

the shore, but not less than 12 feet water will be found on any part within $\frac{1}{2}$ a mile from the general direction of the shore, except at the foot of the bay, where 12 feet are found in spots $\frac{3}{4}$ of a mile from shore.

From the Foot of the East Arm to Traverse City.

From the foot of the bay to the village of Old Mission, the coast can be approached within 1,000 feet everywhere; but $\frac{1}{2}$ a mile south of the village, a flat extends 1,500 feet into the bay. From the point opposite and east of the village, a spit runs out in a SE direction. A dangerous rocky flat extends from Old Mission Point, north and west, for $1\frac{1}{4}$ miles from the shore. From Old Mission Point to Tucker's Point, several spits extend from the shore, making navigation unsafe within $\frac{1}{2}$ a mile from the coast. From Tucker's Point, a rocky spit runs out south for $\frac{3}{4}$ a mile. A rocky spit extends from the south point of Hog Island, for more than $\frac{1}{2}$ a mile to the SW, and a smaller one in a NE direction from its northern point. From Bower's Harbor to Traverse City, the shore can be approached within $\frac{1}{4}$ of a mile.

From Traverse City to Lighthouse Point.

Two miles north of the dock at Traverse City, a dangerous 9 foot spit extends $\frac{1}{2}$ a mile from the shore. The coast from here to Lee's Point, is safe within $\frac{1}{2}$ a mile. From Lee's Point, a spit extends to the south for $\frac{3}{4}$ of a mile. North of Lee's Point, a flat runs, almost $\frac{1}{2}$ mile from the shore, half way to Sutton's Point. From this point, a rocky spit extends $\frac{3}{8}$ of a mile to northward. The western shore of Sutton's Bay is shallow within $\frac{1}{2}$ a mile. The coast from Pishaube's Village to Northport is generally good, but a lookout should be kept for a rocky spit, extending for almost a mile NbyE from the northern end of New Mission Point. There is shoal water for $\frac{1}{4}$ of a mile to north and east of Bellows Island. Two dangerous shoals, with 6 and 8 feet water on them, lie between Northport Point and Northport. A rocky spit runs out in a SE direction for $\frac{1}{2}$ a mile, from a point $\frac{3}{4}$ of a mile north of Northport Point; from thence to Lighthouse Point the shore can be safely approached within $\frac{1}{2}$ a mile,

but at the Lighthouse Point a rocky spit extends $\frac{1}{2}$ a mile to the northward.

From the Lighthouse Point to Point Betsey.

Between the lighthouse and Cat-Head Point, two spits extend over $\frac{1}{2}$ a mile from shore. From Cat-Head to Carp River, the coast can be approached within $\frac{1}{2}$ a mile, but there are two detached 12 feet rocky spots, 4 miles NE $\frac{1}{2}$ N from the dock at Carp River, and $1\frac{3}{4}$ miles from the shore. In Good Harbor Bay are several shoals, with only eight feet water on them. One of these will be found bearing NE $\frac{1}{2}$ N from the dock at Unity, and distant 4 miles. This shoal is directly on the line joining Carp River and Pyramid Point.

Another 8 feet spot bears from Unity Dock NE $\frac{3}{4}$ E, distance $3\frac{3}{4}$ miles, and is a little inside the line joining Unity Dock and Carp River Point. Southeast from this last spot, and $\frac{1}{2}$ a mile distant, is a 10 feet spot. Three miles south of Pyramid Point, a rocky spit runs $\frac{1}{2}$ a mile from shore, and shoal water extends for a mile toward Sleeping Bear. From thence to Point Betsey the shore is bold, and can be approached within $\frac{1}{4}$ of a mile, except at Platt River Point, where a spit extends to the north having only 6 feet water on it $\frac{3}{4}$ of a mile from shore.

Fox and Manitou Islands.

South Manitou Island can be approached within $\frac{1}{4}$ of a mile everywhere except on the south and southwest sides, where shoal water extends $\frac{1}{2}$ a mile from the shore. There is also a rock with only 3 fathoms water on it, SSW $\frac{1}{2}$ W from the SW point of Manitou Island, distance $2\frac{1}{8}$ miles.



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Lake Superior, South Shore.

From Detour Light to Sault Ste. Mary's and White Fish Point.

The channel between Detour passage and Drummond Island is one mile wide, clear of shoal water on either side. The depth of water is from 20 feet to 110 feet, near the centre. The description of Detour Light is given on the course from Thunder Bay to Detour.

Buoys in St. Mary's River: The first buoy in the river is a black buoy on a small reef of rock 500 yards from the shore, and one mile from the dock, just beyond and inside of Frying-pan Island, and three-quarters of a mile from Pipe Island. Second buoy, off Point aux Chene, at the entrance to Mud Lake, 12 foot spar buoy, black. This is the southern buoy in Mud Lake, and the turning point into the lake. The third buoy is at the turning point from Mud Lake into St. Mary's River; has black and white perpendicular stripes, and can be seen by a glass from the black buoy of Point aux Chene. First-class iron can buoy.

Rain's Island.

Buoy, black; 22 foot spar buoy. This buoy marks an 8 foot shoal, 166 yards off the southeast end of Rain's Island. The buoy is placed on the east side of the shoal, in 18 feet water, channel on both sides.

Red buoy, St. Marie, 24 foot spar buoy, in 15 feet water. This buoy marks a small rock in mid-channel, with 10 feet water on it. Channel east of this buoy not safe for vessels drawing over 10 feet.

Mirr's Point

Buoy, black; 16 foot spar buoy. This buoy is placed on the west channel bank, going into Little Mud Lake, 500 feet east of Mirr's Point.

Reid's Point

Buoy, red; 16 foot spar buoy, in 10 feet water.

Point of Woods

Buoy, red; 16 foot spar buoy, in 10 feet water. Point of Woods black buoy; 16 foot spar, in 10 feet water. This buoy marks the end of Point of Woods Shoal. The upper red buoy should be left 25 yards to starboard.

Stribling's Point

Buoy, red 16 foot spar buoy. This buoy is placed on the end of the shoal, extending west 330 yards from Striblings Point, at the head of Little Mud Lake, and is the turning point to each branch of the river, to Bruce mines, and to the East Nebish, in 10 feet water.

South entrance to Collingwood or Bruce Channel. Red buoy; 16 foot spar buoy, in 11 feet water. This buoy marks the end of the shoal, extending 900 yards NE from Stribling's Point.

Harwood Point Buoy,

Black; 16 foot spar buoy. This buoy marks the end of the shoal, extending 300 yards east from Harwood's Point. Between the two buoys, Nos. 14 and 15, the channel is 300 yards wide, and is the turning point for the East Nebish Channel.

East Nebish Rapids.

The East Nebish Rapids are 650 yards in length north and south, and in the narrowest part 30 yards wide, marked by three pairs of spar buoys, placed nearly opposite to each other, in 12 feet water; black and red. The East Nebish is under improvement by the Dominion Government, by blasting rock, widening and deepening the channel, and, I believe, the intention is to pier the starboard side along the island, the whole length of the channel.

Buoys entering Lake George.

First red buoy, to starboard, 18 foot spar buoy, bushy top. This is the southern red buoy, in the cut in Lake George. The cut or artificial channel in Lake George, is $2\frac{3}{8}$ miles in length, NbyW $\frac{1}{2}$ W, and SbyE $\frac{1}{2}$ E, and 195 to 220 feet in width. The banks are marked by 11 pairs of buoys 425 yards apart, 14 feet water between buoys.

First black buoy going up, to port, is an 18 foot spar buoy, bushy top; is in 10 feet water. This is the southern black buoy in the cut in Lake George, with a bushy top. To mark the southern entrance to the cut: The two buoys at the upper end of the cut into Lake George are in 9 feet water close to the edge of the cut. The black buoy has a bushy top, to be left to port.

Churchville Point.

Black buoy, 16 foot spar buoy, bushy top, in 10 feet water. This buoy is placed on the south end of a shoal extending south, three fourths of a mile from Churchville point.

South Point of Squirrel Island.

Buoy, red and black horizontal stripes, 16 foot spar buoy. This buoy is on the end of the shoal, extending south from the south point of the Island 300 yards, and marks the southern entrance to the channels on each side of Squirrel Island.

Buoy of NW end of Squirrel, black, 16 foot spar buoy, in 10 feet water. This buoy is placed on the west channel bank, 400 yards northwest from the north point of Squirrel Island.

Church's Mill, SbyW 550 yards, is on a rocky bottom; there is a good channel of 14 feet between it and the bank of the mill site, and it has always been called a middle ground, and in old times we always left this middle ground to starboard.

Red Buoy

Of north point of Squirrel Island, 16 foot spar buoy. Church's Mill SbyW 550 yards.

Red Buoy

On middle ground in Little Lake George, 16 foot spar buoy, in 11 feet water. This buoy is placed on the southeast end of middle ground. There is a narrow channel to the northward of it, which was used in old times.

Black Buoy

In Little Lake George, 16 foot spar, is on the southeast end of a shoal, extending SE from Palmer's Point seven eighths of a mile. Point Charles bearing NE $\frac{3}{4}$ E, 1050 yards.

Middle Ground,

Little Lake George. Red buoy, 16 foot spar buoy. This buoy is placed on the head of middle ground. Point Charles bearing EbyN 750 yards, in 10 feet water.

Palmer's Point Buoy,

Black, 16 foot spar, in 10 feet water. This buoy is placed on the south channel bank, 250 yards east of Palmer's Point.

Buoy Opposite Partridge Point.

Black, 16 foot spar. This buoy marks the north end of a rocky shoal extending 400 yards west from the shore, in 12 feet water.

Point Lewis.

Black buoy, 16 foot spar. This buoy marks a shoal extending west from Point Lewis, is in 10 feet water.

Red Buoy

On the southwest end of Farmer's Ridge Shoal, 16 foot spar. This buoy marks the southwest end of the Farmer's Ridge, in 10 feet water.

Black Buoy

Opposite the southwest end of Farmer's Ridge, 16 foot spar. This buoy marks the end of a rocky shoal extending north 450 yards from the shore in 10 feet water.

Jenkin's Rock,

Black buoy, 16 foot spar. This buoy is placed near the rock; least water 7 feet.

Marchand's Rock.

Black buoy, 16 foot spar. This buoy is placed near the rock; least water 7 feet.

Topsail Island,

Red buoy, 18 foot spar, in 16 feet water. This buoy is placed on the north side of the rocks. To the northward and eastward of the Bay-field rocks, there are shoals with 9 and 11 feet water. This is the turning point for the Soo Canal. There is another red buoy beyond this near the Canada side; after passing it you can run to any of the Canada docks, or to the docks before you enter the canal.

Sault St. Mary's Canal,

New locks and a new canal, leading into the old canal over half way up, are being built, to carry 15 or 16 feet water through.

SAULT STE. MARIE RIVER.

From the Entrance of Sault Ste. Marie River to Sailors' Encampment.

From a point 1 mile east of Detour Lighthouse run $N\frac{1}{2}E$ 2 miles, to a point $\frac{1}{4}$ of a mile east of Frying Pan Island; thence $NbyW\frac{1}{4}W$, toward the west side of Pipe Island, until within $\frac{1}{4}$ of a mile of it (and observe there is a rocky reef $1\frac{1}{3}$ miles above Frying Pan Island, $\frac{2}{3}$ of a mile below Pipe Island, and $\frac{1}{4}$ of a mile from the mainland on the west, and lying to the west of, and very near to the range line from the west side of Frying Pan to west side of Pipe Island; a black spar buoy is kept on this reef of rock); thence $NW\frac{1}{2}N$ toward the opening between Lime Island and St. Joseph Island, for $2\frac{1}{2}$ miles, to abreast of a spit putting out from some small islands near the mainland to the SW; thence $NWbyW\frac{1}{2}W$ 3 miles to abreast of and to the west of the small island near the foot of Lime Island; and note that whilst this small island is kept open from Lime Island, it is not safe to approach these islands nearer than from $\frac{1}{3}$ to $\frac{1}{2}$ a mile, on account of a sandy shoal of 6 feet water at about 700 yards west of the small island, and $\frac{1}{4}$ of a mile SW of the lower end of Lime Island. Above this the shore of Lime Island is bold, and may be approached within less than $\frac{1}{4}$ of a mile in safety. Having passed Lime Island, get upon the north and south line, which will just clear the west side of it, and run north, leaving Round Island to port, and pass about 2 miles beyond it and abreast of Grosse Point; then change your course $NW\frac{3}{4}W$ for about $6\frac{3}{4}$ miles, through Mud Lake, to the mouth of the channel between Sailor's Encampment Island and St. Joseph's Island. These courses are true; distances statute mile.

Just north of Frying Pan Island there is a good dock, with wood and coal, and plenty of water alongside.

When up to the turning point, to enter the channel to the Sailors' Encampment, observe that the dock at St. Joseph's Island should be just open with the bluff below it on the starboard side; then steer over NbyE, keeping on the range until up to the dock. There is a middle ground opposite this dock with 10 feet water on it. You can pass it on either side.

After passing the Sailor's Encampment, keep the port side of the river well aboard until you enter Little Mud Lake; run across it N $\frac{1}{2}$ W. The soundings over this lake are very regular, from $2\frac{3}{4}$ to $3\frac{1}{2}$ fathoms; and when up to the head, run out NE $\frac{1}{2}$ E, pass round the black buoy to port, 50 yards off, and haul up river in mid-channel till you make the buoys in the Nebish Rapids, open them and run up, leaving black buoys to port, and red buoys to starboard, until up to the last red buoy at the head of the rapids; thence NNW, keeping the middle of the river until up to North Rock Island, above Duck Island; thence NbyW for the red buoy with bush on it, at the entrance of the cut across Lake George. Run through, leaving black buoys to port and red buoys to starboard, and when up to the head of the cut, and clear of the buoys 100 yards, haul up NNE 5 miles for the buoy off Church's Point—black buoy with bush on it—haul up round this buoy, heading for Church's Point, passing the red striped buoy at the foot of Squirrel Island, which indicates both channels, to starboard, run up along close to Church's Point and dock, or in mid-channel, until you pass the first point off Squirrel Island, when you will see the black buoy nearly midway from Church's Mill to the north point of the island; haul up, leaving the black buoy to port, and the red buoys off the north end of Squirrel Island to starboard, then run well over to the Canada side of the river, and follow that shore close along until you get abreast of Garden River Church; then take the centre and follow the curve of the river, steering W $\frac{1}{2}$ S until you make the first red buoy to starboard, give the red buoy a good berth, say 100 feet, and make for the first black buoy to port. As you proceed you will make the second red buoy to starboard, and the second black buoy to port, which is 250 yards east of Palmer's Point, the course is NNW $\frac{1}{2}$ N in channel. When past this buoy steer well up into Clark's Bay, past the point, called Point Aux Pins, on the starboard hand, where there

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are two or three small houses, until you open the river and bring the black buoy or buoys in line, then haul up river, passing a low point of land that makes out a short distance into the river from the main land, Ont., $1\frac{1}{2}$ miles from Clark's Bay. The water is deep close to this point, and from here you can see the red buoy off Farmer's Ridge, and the black buoy on the point to port. Give them a berth of 100 feet, and keep on up river, hauling gradually round, until you make the three black buoys on the port side, and Topsail Island red buoy to starboard. Along by these last black buoys, the channel is narrow and rocky; when up and past Topsail Island red buoy, at 50 yards distance, steer straight for the outside end of the pier at the Soo Ste. Marie's entrance to canal, run through the canal and proceed up river above the rapids.

NOTE.—The course from Topsail Island after clearing the buoy is WNW, and there is generally one more red buoy nearest to the Canada side, about half way to canal. Bayfield's red buoy the first buoy east of the canal.

Ste. Marie River, Above the Rapids.

After leaving the canal, at the distance of 300 yards, haul up the river, steering WbyS $2\frac{1}{4}$ miles, or until the first prominent point, called Big Point, bears south; thence SWbyW, till Point au Par bears NW; then $SW\frac{3}{4}S$, to a point about 500 feet off shore, and due south from the houses above Point au Par, and in the little bay, called Clark's Bay; then haul up for the woody point below the Mission, at Waiska Bay, leaving Round Island and light to port, $\frac{1}{2}$ a mile distant, until Point Iroquois Lighthouse bears NWbyW $\frac{1}{2}W$; haul up on this course till the Mission House bears SW (the dock being gone); thence $NW\frac{1}{2}N$ 25 miles, to White Fish Point.

NOTE.—The course from the low sandy point beyond Clark's Bay to the woody point below the Mission, is WSW. Opposite Point au Par a shoal makes off from the U. S. side, about two-thirds across the river, under which will be found good anchorage in $5\frac{1}{2}$ fathoms, soft bottom.

First Red Buoy,

After leaving the canal, in St. Mary river Vidal Shoal, 16 foot spar buoy in 11 feet water. North of the Vidal shoal are rocks with 5 feet

water on them. Farragut bluff SbyE, 1200 yards. The western entrance to the canal E $\frac{3}{4}$ N, 2100 yards. Light at the canal on the port pier, a white light on a white tower about 20 feet high.

Point Au Par

Lighthouse, Ontario, St. Mary's river, 5 $\frac{3}{4}$ miles above the Soo Canal. Fixed white, visible 8 miles, a white square wooden tower, 30 feet above water level; is on a low sandy point, called by U. S. Survey Point Louisa; a red buoy, 16 foot spar, in 12 feet water. This buoy is placed on the North Channel bank, SWbyW $\frac{1}{2}$ W, 900 yards from Point Louisa. South extreme of Shoal Bay, S $\frac{7}{8}$ E, 1 $\frac{7}{8}$ miles, and is second red buoy above the Soo Canal.

Round Island Lighthouse,

In White Fish Bay, near the entrance to Soo river. A fixed white light, visible 13 $\frac{1}{2}$ miles, 50 feet above lake level. Light on square stone tower, rising from the corner of the keeper's dwelling. A guide to and from the entrance to Lake Superior, 2 $\frac{1}{2}$ miles from Point Au Par and 3 miles to Waiskar Bay.

Round Island Point

Buoy, black, 16 foot spar, in 12 feet water. This buoy is placed on the South Channel bank. Bearings, Round Island Point, SWbyS, 1300 yards. Bearings Point Louisa, NNE 1 $\frac{7}{8}$ miles.

Middle Ground, off Round Island Lighthouse,

Red, 16 foot spar, in 12 feet water. This buoy is placed on the south end of the Middle Ground.

Shoal off Round Island Lighthouse.

Black and red horizontal stripes, third class iron can buoy. This buoy is placed on the centre of three small shoals, 400 yards south of the middle ground. The channel between the middle ground and small shoals is 350 yards wide. Bearings: Round Island Point E $\frac{7}{8}$ S 2 miles. Point Extreme SW $\frac{1}{4}$ W 2 $\frac{1}{8}$ miles. Waiskar Bay has a saw mill and wood dock.

Point Iroquois,

On the south shore of White Fish Bay. Light flashes white. Time between flashes, thirty seconds. Visible 15 miles; 72 feet above lake level; is on a brick tower, connected with the keeper's dwelling by a covered way, all whitewashed; a guide to and from the River St. Marie. Parisien Island NbyW $\frac{1}{2}$ W 12 miles.

From Point Iroquois Light, bearing SWbyW $1\frac{3}{4}$ miles, to White Fish Point NW $\frac{1}{2}$ N 25 miles. White Fish Point Light, at the outlet of Lake Superior, is a fixed white light, visible $15\frac{1}{2}$ miles; 76 feet above lake level; is an iron pile structure, connected with keeper's frame dwelling; painted white; a guide to and from White Fish Bay, at the southeast extremity of Lake Superior; has a ten inch steam fog whistle, giving a blast of eight seconds, followed by an interval of ten seconds; then a blast of two seconds, followed by an interval of 40 seconds, alternating in this manner every minute. Bearings: south point of Michipicoten Island, Canada, NW $\frac{3}{4}$ W $79\frac{1}{2}$ miles. Mainse Point, Canada, NEbyN $\frac{3}{4}$ N $17\frac{1}{2}$ miles.

From White Fish Point to Sauble Lighthouse,

Bearing south 2 miles, steer W $\frac{1}{2}$ S $56\frac{1}{2}$ miles.

Big Sauble Lighthouse, at Big Point au Sauble, on the south shore of Lake Superior, between White Fish Point and Grand Island. A fixed white light, visible $17\frac{1}{2}$ miles; 107 feet above lake level. This light is on a whitewashed, brick tower, connected with the keeper's dwelling by a covered way; is a coast light, Grand Island light bearing WbyS $\frac{1}{2}$ S $22\frac{1}{2}$ miles.

NOTE.—The shore can be followed all the way along from White Fish Point to Big Sauble, and also to the Pictured Rocks, at the distance of two miles, with safety, and at the Pictured Rocks you can lay alongside of them in many places.

From Big Sauble to Grand Island Harbor Light.

Steer SWbyW $18\frac{1}{2}$ miles to abreast of Grand Portal, when steer SW about 6 miles to a point $\frac{1}{3}$ of a mile west of Castle Point; thence same course 4 miles to the narrows at Sand Point, or abreast of the lighthouse opposite the spit off Sand Point, which may be approached

and passed within 200 yards; and thence SWbyS $\frac{1}{2}$ S $3\frac{1}{2}$ miles to head of South Bay, passing Minnising iron dock to port, where anchor in 6 fathoms water. A 14 foot spar buoy, black, will be placed on the extreme end of the shoal off Sand Point, in 15 feet water, to be left on the port side going into the bay.

From Grand Island Harbor Light,

On the low sand point projecting from Grand Island, into the east entrance to Grand Island Harbor. Is a fixed white light, visible $13\frac{1}{2}$ miles; 49 feet above lake level; on keepers wooden dwelling; to guide through the eastern passage to the anchorage at Grand Island Harbor. A flat sets off from the mainland towards this lighthouse two-thirds across the entrance to Grand Island Harbor, and is called Sand Point. Very shallow water on it. Bearings from light: Sand Point EbyS $\frac{1}{2}$ S one mile; Powell's Point SWbyW $\frac{1}{4}$ W $1\frac{1}{8}$ miles. There is a good dock at the furnace, on port side as you pass into the bay. Fourteen to sixteen feet water alongside.

From White Fish Point to Grand Island Main Light,

WbyS 73 miles, bearing south 3 miles; is on the north point of Grand Island, on a high bluff; fixed, varied by white flashes. Time between flashes, one minute and 30 seconds; visible 20 miles; stands 205 feet above lake level; tower rising from keeper's dwelling, built of yellow brick. Bearings from light: Southwest Point Shoal, off Caribou Island, Canada, NE $\frac{1}{2}$ N 66 miles; south point of Montreal Island, Canada, NEbyE $\frac{1}{2}$ E 105 miles. A good lee can be made on the east side of Caribou Island, in 5 to 7 fathoms water, good holding ground.

Grand Island Harbor Ranges,

Front light, on the mainland, at west entrance to Grand Island Harbor; fixed white, visible 10 miles; 23 feet above lake level. Rear light; fixed white, visible $12\frac{1}{2}$ miles; 41 feet above lake level. Bearings: Southeast point of Williams' Island NWbyN $\frac{3}{8}$ N, $2\frac{3}{8}$ miles; Williams' Landing, Grand Island, NE $\frac{1}{4}$ E $1\frac{1}{4}$ miles. Front light in wooden tower; rear light on keeper's frame dwelling. These lights are 500 feet apart; a guide for entering the west channel to the anchorage of Grand Island Harbor. From Grand Island main light

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to enter the west channel from the light bearing south three miles, follow the island round to the southward and westward, until you bring the north point of Wood Island to bear west $\frac{1}{8}$ of a mile, and the lights in range; steer SbyE $\frac{1}{2}$ E 5 miles, towards the range lights. At this point a vessel should be about five-eighths of a mile north of range lights, and should have opened the two extreme south points of the island; then haul to the westward for the respective anchorages, keeping Powell's Point close aboard. The best anchorage is off Williams' House, or a little beyond his dock, at the landing, with the southeast point of Grand Island to port, in Williams' Bay.

The bank is very bold on the east of the point at Williams' Landing; and vessels drawing 12 feet can approach within 100 feet of the shore. Williams has a wood dock at the landing. From Williams' Landing to Powell's Point SE one-half and one-eighth of a mile; and from Williams' Landing, in a south line to the mainland west of Powell's Point, the channel is $\frac{1}{2}$ mile wide. The breadth of the channel between the lighthouse and the spit off Sand Point, is one-quarter of a mile to 12 feet, water curve. Iron Works Dock is $\frac{5}{8}$ of a mile from the range stations to the westward. Good water alongside the dock. The channel leading to this dock is buoyed out.

SAILING DIRECTIONS FOR GRAND ISLAND, ACCORDING TO THE LAST SURVEY.

To Enter South Bay and Williams' Harbor from the East.

To enter South Bay when abreast of Chapel Rock, and 1 mile north of it, steer SW about 6 miles, to a point $\frac{1}{3}$ of a mile west of Castle Point; thence same course 4 miles to the Narrows, at Sand Point; and thence SWbyS $\frac{1}{4}$ S $3\frac{1}{8}$ miles to the head of South Bay, and come to in 6 fathoms water.

To make Williams' Landing.

Steer SW as above, from the point $\frac{1}{3}$ of a mile west of Castle Point, $4\frac{1}{2}$ miles; thence W $\frac{1}{4}$ N 2 miles, and anchor in 7 to 10 fathoms water, 400 feet from the shore. The bank is very bold on

the east of the Point at Williams' Landing, and vessels drawing 12 feet can approach within 100 feet of the shore.

To Enter the Bay from the West.

To enter South Bay, passing to the north of Wood Island, from Marquette, steer $E\frac{1}{2}S$ about $3\frac{1}{2}$ miles to a point 1 mile north of Wood Island, leaving Point au Sauble 1 mile to the south; thence $SSE\frac{1}{4}E$, heading clear of the SW point of Grand Island, to a point $\frac{1}{2}$ mile NE of the north point of Williams' Island $3\frac{1}{8}$ miles, or until the north point of Williams' Island ranges with the point of the main land to the SW; thence $SbyE\frac{1}{2}E$ 3 miles, or until the two lower points of Grand Island are in range; thence $EbyS$ heading for Powell's Point, 1 mile, or until SW point of Grand Island and south point of Williams' Island are in range, and thence $NE\frac{1}{2}N$ $\frac{2}{3}$ of a mile to Williams' Landing.

A new town plat has been laid out on the opposite side of Williams' Bay, on the mainland, called Grand Island City and Powell's Point.

To Enter South Bay, Passing South of Wood Island and North of Williams' Island.

When abreast of Sauble Point, as above, steer $EbyS\frac{1}{4}S$ $14\frac{1}{2}$ miles, passing midway between Wood Island and Williams' Island, to the point designated above, $\frac{1}{2}$ a mile NE of Williams' Island, and thence as above directed to Williams' Landing.

To Leave South Bay or Williams' Landing.

Vessels going eastward will reverse the course given for vessels coming from the east, and those going west will reverse the courses given for vessels coming from the west. In South Bay the anchorage is good, and vessels can lie in 3 fathoms water at any point $\frac{1}{4}$ of a mile from the shore.

To Enter Grand Island Harbor From the East.

A lighthouse has been erected upon the low sand point projecting from Grand Island into the east entrance to Grand Island Harbor.

Vessels entering the harbor from the east, can steer straight for the Lighthouse, leaving it on the starboard hand, and pass within 200 yards of it.

The lighthouse is built of wood, and painted white, and from its tower a fourth order fixed white light will be exhibited at an elevation of 34 feet above the level of the lake.

Western Entrance.

Range lights have also been erected on the mainland, to vessels into this harbor through the west channel. The rear light is white—exhibited from the keeper's dwelling—the front light (white), and is exhibited from a small wooden tower. Both structures are painted white, the distance between them being 500 feet; steer on the range until the harbor is well open, then haul up for it.

Dangers to be Avoided.

In passing through the Narrows at Sand Point, give the point a wide berth, and avoid the sand spit, which lies to the north and NW of it $\frac{1}{3}$ of a mile, on which there is but 5 feet water; and in passing round the SW point of Grand Island, beware of sandspits which extend nearly $\frac{1}{2}$ a mile from shore, and on which there are but 5 feet water also.

There are numerous rocks and sand spits between the south point of Williams' Island and the main shore to the south of it, on which there are but 8 and 10 feet water, making it dangerous for vessels drawing over 8 feet water, to attempt to pass between Williams' Island and the main shore.

From Grand Island to Marquette.

With the light bearing south, steer $W\frac{1}{4}S$ 35 miles to Marquette Lighthouse, bearing $WbyN$ 2 miles. The light is on the north point of Marquette Harbor; is a fixed white light, visible $15\frac{1}{2}$ miles; 77 feet above lake level; tower rises from keeper's dwelling, built of yellow brick. Bearings: Grand Island Light $E\frac{1}{8}N$ 35 miles; southwest point of Michipicoten Island, Canada, $NE\frac{1}{2}N$ 103 miles. A 10 inch steam fog whistle, giving two blasts in each minute, with equal intervals between them; duration of each blast alternately, 5 and 10 seconds.

Marquette Breakwater.

Light 84 feet from the outer end of breakwater. Fixed red light, visible 12 miles; 40 feet above lake level, on an open, frame

work tower, with elevated walk leading from it to the shore; tower and walk painted white; a guide into Marquette Harbor. To enter the harbor, run in, leaving the end of the breakwater pier 50 feet to starboard and Ripley's Island to port; come to anchor or run to any of the docks; 12 to 14 feet water alongside, and $3\frac{1}{2}$ fathoms anchorage.

From Marquette to Portage Entry, Sixty-five Miles, as Follows: Inside Passage.

Run out from the dock east-northerly until Granite Island is open with Presqu'ile Bluff (a Lighthouse has been erected on this island, and shows a fixed white light, varied by red flashes of the fourth order of lens, elevated 93 feet above the lake level); then haul up for the bluff, passing it close to, and leaving two or three small rocky islands to starboard, which are nearly abreast of Presqu'ile Bluff; then shape your course for Granite Island NWbyN, leaving it 2 miles to the northward; when abreast the island, which is 12 miles from Marquette, keep on the same course 12 miles farther; thence NW by W 17 miles, to abreast the Huron Islands where a lighthouse has been erected on the West Island; thence $W\frac{1}{2}N$ 10 miles, to Point Abbaye, leaving the Huron Islands to port; thence $W\frac{1}{2}S$ 14 miles, to Portage Entry. Run past the Lighthouse point and into the bay, and come to in $2\frac{1}{4}$ fathoms water, with the houses at the entry bearing NNW. Ranges are to be placed for running into Portage Entry.

Portage Bay is not a safe place in a heavy NE or E wind; but a good harbor can be made 10 or 12 miles up LeAnse Bay, on the east side, called Kocknawaugon. It is a perfect harbor, and safe from any winds.

To go in, haul round the south point of the bay or harbor and run in, giving the point a good berth; run well up into the bay, and come to in 3 to 5 fathoms water, soft bottom.

The Missions are on each side of LeAnse Bay, 2 miles south of this harbor; the Methodist on the east, and the Catholic on the west. Excellent fishing all over LeAnse Bay.

From Marquette to Portage Entry—Outside Passage.

Run out from the dock east-northerly until well clear of the lighthouse point, and the rocks which lie off from it, about 1 mile; then

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haul up NNE 5 or 6 miles, until Granite Island bears NW; thence NW 1/4 N 9 miles, to abreast of the island, which leave to port close to; thence NW to abreast the Huron Islands; and thence as above. On this route you leave the rocky islands off Presqu'île to port.

From Portage to Manitou Island Lighthouse NE 1/4 E 46 miles, leaving Traverse Island to port 8 miles from Portage Lighthouse. Good anchorage under Traverse Island, and also the next point north of it.

Bete Grise Bay, 15 miles WbyS from Manitou Island, has good shelter from north to west winds, and also under Point Kenawana.

Lake La Belle lies at the SW end of Bete Grise Bay, and is capable of being made into an excellent harbor, by a cut across a narrow neck of land. The copper mines of Eagle Harbor and vicinity, are but a short distance from the lake, and the proprietors are making every effort to dredge a channel and build piers, which, when completed would be of incalculable advantage to them for shipping their copper, and also to the mariner as a safe harbor of refuge. This improvement is now going on and piers built. A lighthouse is to be erected at the entrance of this harbor when completed.

There is a good channel between Manitou Island and Point Keweenaw. To run through, give the SE point a good berth, and haul up to the northward and westward, leaving Manitou Island to the eastward.

Granite Island

Light; on Granite Island, 12 miles NW of Marquette. Is fixed, varied by red flashes. Time between flashes, one minute and thirty seconds. Visible 16 1/2 miles, 93 feet above lake level. Tower rises from keeper's dwelling, built of granite. Bearings, Grand Island light EbyS 1/2 S, 36 miles; Manitou Island light, N 3/4 W, 48 1/2 miles.

Huron Islands Lighthouse on West Huron Island,

Off Huron Bay, fixed white, visible 22 miles, 197 feet above lake level. Tower rises from keeper's dwelling, built of granite. The steam fog signal is located on the northwest corner of West Huron Island, a 10 inch steam fog whistle, giving a blast 8 seconds long, at intervals of 52 seconds. Bearings, Keweenaw Point NEbyN 3/4 N,

34 miles; Traverse Point, NW $\frac{1}{2}$ N 16 $\frac{1}{2}$ miles; Point Abbaye W $\frac{1}{4}$ S, 6 $\frac{1}{4}$ miles.

To enter Huron Bay north of Huron Islands: When one mile north of Huron Island lighthouse, steer SWbyW $\frac{1}{2}$ W for 12 miles, then follow up the middle of the bay, where good anchorage and protection from all winds will be found.

A good lee can be made on the southwest side of West Huron Island, in 5 $\frac{1}{2}$ fathoms, close to the island, with the middle of the island bearing NE, and three small islands, detached from the south end of Huron Island to the southward, which forms a bay. The water is deep from Huron Island to the shoal due east from Point Abbaye, which shoal is $\frac{3}{4}$ of a mile from the Point and 4 $\frac{1}{4}$ miles from the north end of Huron Island. There is a good channel between the shoal and the point, with nothing less than 18 feet water. The course through is north and south. The least water on shoal is 6 $\frac{1}{2}$ feet near the centre and from 8 to 9 and 10 on the outer parts of it. Mount Huron is 931 feet high. Little Huron river lays about south from the lighthouse 4 miles and Huron river SSW 4 $\frac{1}{2}$ miles. The Government has a wharf 12 miles up the bay on the south side, where it is getting out timber, and preparing materials for Stanard's Rock lighthouse, which is being constructed.

Stanard's Rock.

A lighthouse is being erected on this rock. Bearings, Grand Island light, SSE $\frac{1}{2}$ E, 49 $\frac{1}{2}$ miles; Huron Islands light, WSW 39 $\frac{1}{2}$ miles; Manitou Island light, NW, 23 $\frac{1}{2}$ miles. To the northward and westward of the beacon that was, and where the lighthouse is being built, a rocky reef extends 430 by 320 yards; least water 2 feet. 1,400 feet west of the beacon, are two detached rocks, with 8 feet water. The soundings in proximity to the beacon and reef, are from 3 $\frac{1}{2}$ to 10 fathoms. Bottom, rock and gravel. Vessels should not approach the beacon to the northward nearer than three fourths of a mile.

L'Anse lighthouse to be built.

Portage River.

The lighthouse is on the Point one mile east of the entrance of Portage river; is fixed, varied by red flashes; time between flashes

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two minutes; 68 feet above lake level, visible 15 miles. Stone and brick tower, connected with dwelling of red brick, by a covered way marks approach to Portage river; bearings, Point Abbaye $E\frac{1}{2}S$, 13 miles; Traverse Island, $NE\frac{3}{4}E$, 9 miles.

Portage Range Lights,

Front and rear, are both white lights visible 10 and $10\frac{1}{2}$ miles. Front light on wooden tower, rear light on keeper's dwelling; guide into Portage river. Lights 500 feet apart, North 9° West, and South 9° E. The front light is 700 yards inland, or north from the shore.

From Portage Entry to Catholic Mission: run out from Portage Entry piers until the lighthouse outside bears NE. Then steer due south for the Methodist Mission, $11\frac{1}{4}$ miles, or SbyW for Roman Catholic Mission, 11 miles.

Good anchorage and protection from all winds in the small bay south of Catholic Mission, close to the town of Baragua.

From Portage entry to the docks at L'Anse: Run out from Portage piers till the lighthouse outside bears NE; thence $S\frac{1}{2}W\ 14\frac{1}{2}$ miles to the docks at L'Anse.

Manitou Lighthouse.

On the east point of Manitou Island. The light is fixed, varied by white flashes; time between flashes one minute thirty seconds; visible 16 miles, 81 feet above lake level. Iron pile structure, connected by a covered way with keeper's dwelling of wood, painted white. A coast light, 6 miles EbyN from Keweenaw point; has a 10 inch steam fog whistle, giving alternate blasts of 3 and 5 seconds, with intervals of 26 seconds. Bearings, Stanard's Rock $SE\ 23\frac{1}{2}$ miles; Grand Island Light $SEbyS\ 72\frac{1}{2}$ miles. This last mentioned course would pass about $3\frac{1}{2}$ miles to the southward and westward of Stanard's Rock.

Gull Rock Lighthouse,

On a rocky islet, between Keweenaw Point and Manitou Island; a fixed red light, visible $13\frac{1}{2}$ miles, 50 feet above lake level. Tower rises from keeper's dwelling, built of yellow brick; a guide through the passage, between Gull Rock, which lies near the western end of Manitou Island, and Keweenaw Point. Bearings, Huron Island light

SWbyS $\frac{3}{4}$ S, 35 miles; Granite Island light, SbyE $\frac{1}{8}$ E, 49 miles; Portage River Point light SW $\frac{1}{2}$ W, 46 $\frac{1}{2}$ miles.

Copper Harbor Lighthouse,

On the eastern point of the entrance to Copper Harbor, Mich.; light fixed white, visible 14 $\frac{1}{2}$ miles, 65 feet above lake level. A fog horn is used in foggy weather; tower and keeper's dwelling connected; built of Milwaukee brick.

Copper Harbor Ranges,

Front and rear white lights, visible 10 and 12 miles, one 22 and the other 30 feet above lake level, to guide vessels into Copper Harbor. The front light is in a wooden tower; rear light on keeper's frame dwelling, 500 feet apart.

Bearings: Southwest point of Michipicoten Island (Canada) EbyN, 89 miles; northeast point of Isle Royal NWbyN $\frac{1}{2}$ N, 58 miles; these bearings are from the main light.

To enter Copper Harbor: Run in on the range till you drop into 30 feet water; then steer for the docks. The range is about SbyW. From the small rocks on the starboard hand going in to the main shore is $\frac{3}{4}$ and $\frac{1}{8}$ of a mile. Course of the bay to the outer dock W $\frac{1}{4}$ N 1 $\frac{1}{2}$ miles.

From Manitou Island to Copper Harbor, West by North Fourteen Miles.

To run into Copper Harbor, coming from the eastward, keep along shore until past the point where the lighthouse stands, keeping on the range until past the rocks which are above water, and plain to be seen in daylight; then haul up the bay, steering W $\frac{1}{4}$ S, until past Potter's Island, and come to anchor or run alongside the dock. The water is deep close round the lighthouse point, and vessels can make a good harbor from easterly winds by hauling up into the bay to the eastward, closing in the light from a north line, and come to in 3 to 4 fathoms. The land is high all round Point Keweenaw. In coming from the eastward, a rocky hill, Mount Houghton, 800 feet high, and and 12 miles SW of Point Keweenaw, can be seen from 40 to 50 miles, and is a good leading mark.

The harbor is formed by a number of small rocky islands, just above water, extending from Potter's Island towards the lighthouse, nearly east and west. Deep water going in.

From Copper Harbor to Agate Harbor, Eight and one-half miles.

To enter the north harbor, bring the target or beacon on the main shore (about $\frac{1}{2}$ a mile east of the large warehouse) to bear SSE, and run on this course until the houses on the south shore of the south harbor come in range with Agate Point; then haul up $E\frac{1}{4}N$ to the anchorage in the middle of the harbor, in 4 to 5 fathoms, mud bottom.

To enter the south harbor, bring the target or beacon to bear SSE, and run for it until the small rocky island to the west of Agate Point is just opened with this point; then haul up for the houses on the north side of the south harbor, and run for them until abreast of Agate Point; then steer for the wharf or dock, or come to in the middle of the harbor in $3\frac{1}{2}$ to 4 fathoms water, mud bottom.

Eagle Harbor, Five and one-half Miles West of Agate Harbor.

To enter the harbor by the east channel, bring the lighthouse to bear $WSW\frac{1}{4}S$, and run for it until the eastern point of the harbor bears due south, and is distant $\frac{3}{8}$ of a mile; then steer $SW\frac{1}{4}S$ to a point about 160 feet east of the most eastern point of Senter's dock.

To enter the harbor by the west channel, bring the cleft in the rock and signal target in rear in range, when the compass should read $SEbyS\frac{3}{4}S$, and run on this course and range until the bar at the mouth of the harbor is passed; then haul up for the dock, or come to in $3\frac{1}{2}$ fathoms water, sandy bottom.

The reef which lies outside the harbor is three-sixteenths of a mile north of the east point of the harbor at the eastern end, and the same distance from the lighthouse to the western end of it. The least water is 3 and 4 feet on the east end and north from the point; the least water on the west end is 5 and 6 feet, due north from the middle of the bar; and on the extreme ends east and west, 16 and 18 feet. There is a patch with 12 feet on it, north of the lighthouse, and

west of the middle ground or shoal. In running on the ranges to enter the harbor, you will have from 11 to 16 feet water on the bar, and 18 to 24 feet inside.

Old range for going in by the east channel: Range the southeastern end or angle of Senter's dock, and run for it, bearing SW $\frac{3}{4}$ W, until the target opens in the cleft in the rock; thence SW $\frac{1}{4}$ S, until in 22 feet water. Vessels not drawing over 8 feet, can run in on this range clear up to the dock.

From Eagle Harbor to Eagle River, Southwest by West one-half West Seven Miles.

There is no harbor at Eagle River. To come to the dock, keep a long, low, lead-colored house, with a chimney on the north end of it, in a line with the second window of the hotel just behind the house, and run over the middle ground in 3 fathoms water; when over, you drop into 4 and 5 fathoms, and run for the dock. The dock or pier runs out NW. Or, bring the end of the dock to bear south at the distance of two miles, and run for it. In approaching the dock, keep well to the westward, and go in at an angle of 40°, to clear the sand bank that has formed off the end of the pier. There was only 9 feet water at the pier in 1877, and you cannot go to the eastward of the pier at all. In running in at night, bring the lighthouse to bear S by E $\frac{1}{2}$ E, and run for it till over the bar and near the dock; then go in as above. On this range you run over the western spit in three fathoms water, and a little over $\frac{1}{2}$ a mile from the end of the pier. In going out, bound to the westward, run the shore along for 2 miles, and shape your course for Ontonagon River SW by W $\frac{1}{2}$ W 13 miles; thence SW $\frac{1}{4}$ S 45 miles.

Eagle Harbor Lighthouse,

On the west point of the entrance of Eagle harbor, Michigan. Fixed, varied by white flashes. Time between flashes, two minutes; visible 14 miles; 58 feet above lake level. Tower rises from the corner of keeper's dwelling, built of red brick. Bearings: Southwest point of Isle Royal NW by W $\frac{1}{2}$ W 55 miles; south point of the Slate Islands, Canada, NE by N 96 miles.

This harbor is under improvement by deepening the channel, and it is contemplated to make a pier breakwater from the east point of the harbor to the east edge of the channel; and also another from the west point to the west edge of the channel. The bottom across is rock and boulders, and if this work is done, it will make a safe harbor; even now it is a good harbor, but there is not much room inside for a number of vessels to swing to their anchors. The docks on the west side are good, with plenty of water. Depth of water going in, 14 feet.

Eagle Harbor.

The depth of water over bar going in is 14 feet. It is proposed by the Government to build two piers of protection, one on the east side from the point towards the channel, in a WSW direction, and the other from the west side, running ENE. This pier will be 100 feet more to the northward than the east one, and will leave a channel of 200 feet. In going in on the range, when over the bar and in 18 to 20 feet water, haul up for the Senter's dock, or come to anchor near the middle of the bay.

Eagle River,

Seven miles west of Eagle Harbor. Light near the entrance to Eagle River, south shore of Lake Superior. Fixed white, visible 14 miles; 61 feet above lake level, and is in the town of Eagle River. Light on keeper's dwelling; a guide to the pier; is a coast light. Bearings: Northeast point of Isle Royal, north 59 miles; Grand Portage Island NW $3\frac{1}{4}$ W 70 $\frac{1}{2}$ miles.

Portage Lake Ship Canal

Lighthouse, at the entrance to Portage Ship Canal, on the west side of the cut. Light fixed white, visible 14 miles; 56 feet above lake level; a coast and harbor light on square tower forming canal front of keeper's dwelling, built of red brick; octagonal iron lantern, painted black; building is red, the color of the brick. Depth of water varies from 9 $\frac{1}{4}$ to 12 feet. Is being dredged at present.

Ontonagon River Lighthouse,

At the mouth of the Ontonagon River. Is a fixed white light, visible 13 miles; 47 feet above lake level, on the west side of the river.

Tower rises from keeper's dwelling, built of yellow brick.

Pier-head light, on the west pier, about 200 feet from the outer end. Fixed red light, visible 11 miles, 27 feet above lake level; built on a wooden hexagonal tower, with open frame base, painted white; a guide into Ontonagon River. Depth of water, 11 feet, and variable. Bearings: Northeast point of Isle Royal NNE $\frac{1}{4}$ E 100 miles; north point of the outer or eastermost of the Apostle group of islands WbyN $\frac{3}{4}$ N 53 $\frac{1}{2}$ miles. The water at the entrance to the piers can not be trusted to, as an average. Sand washes in and across the channel in heavy gales from the SW.

Outer Island Lighthouse,

On the most northerly point of Outer Island, (Apostle group.) This light flashes white. Time between flashes, 1 minute and 30 seconds; visible 19 $\frac{1}{4}$ miles; 130 feet above lake level, on a brick tower, whitewashed, connected by a covered way with keepers dwelling, also of brick. A coast light and guide to vessels passing up or down, outside the islands. A ten inch fog whistle, giving a blast of 8 seconds, with intervals of 52 seconds.

From Ontonagon to La Point.

From Ontonagon piers run out 2 or 3 miles NNW, and haul up W $\frac{1}{2}$ S 21 miles, to clear the land under the Porcupine Mountains and Lone Rock; thence WbyS $\frac{1}{4}$ S 45 miles, to La Point Lighthouse on Chagwaumegon Point.

As you approach the lighthouse you leave Madeline and the Apostle Islands to starboard, and haul up for the sandy point, keeping it well aboard until past the lighthouse; thence haul up NW northerly for the town of Bayfield, which has a good dock and a saw mill.

La Point and the Mission is on the east side of the bay; has a dock and good holding ground in from 3 to 5 fathoms, mud bottom.

Off the SW point of Madeline Island a reef sets off $\frac{1}{2}$ to $\frac{3}{4}$ of a mile in a southerly direction, and opposite the lighthouse.

To Run through the Island Passage to Fond du Lac.

From the dock or Bayfield run the main land along, leaving Sugar Island, Cap Island, Oak Island and Raspberry Islands to star-

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board; keep mid-channel, and when abreast of Cap Island haul off to the NW, leaving York or Sand Islands and Little Fishing Island to port; run out NW 6 or 7 miles from York Island, and $3\frac{1}{4}$ miles from Little Fiseing Island; thence SWbyW $\frac{3}{4}$ W 57 miles, to Minnesota Point Lighthouse, at the entrance to Fond du Lac Bay or Superior City.

The Apostle Islands are a group lying off the mainland at La Point. The water is deep through these islands, and the shoals are plain to be seen in clear weather. The land is of a good quality, with plenty of timber of all kinds.

To run through this passage from Ontonagon, steer W $\frac{1}{2}$ S 51 miles, to Passage Island Lighthouse; thence WbyN $\frac{1}{2}$ N 10 miles, to Oak Island Dock, to starboard, leaving Cap Island close to, to port, and run out NW, leaving Raspberry Island to starboard, and York Island to port; then steer as directed for Fond du Lac.

From Passage Island to Chagwaumegon Point Lighthouse SWby S 17 miles, until the lighthouse is open with the SW point of Madeline Island; then haul up for it, and run in as directed for Bayfield.

From Passage Island Lighthouse to Rock Harbor, Isle Royal.

Run out from the lighthouse EbyS 2 miles, and haul up NE $\frac{1}{4}$ E 118 miles, to Isle Royal, passing Siskowit Bay close to; bring the lighthouse at Rock Harbor to bear NW $\frac{1}{4}$ W, and run for it until well up to the group of Islands at the entrance to the harbor; run through leaving the first small patch of islands to port which lie NE from the lighthouse, and haul up into the bay to the SW, and come to in 12 to 16 fathoms water, mud bottom, closing in the lighthouse. There is a good channel on the SW side of this first group of islands next to the lighthouse point, but is not so straight as the first one mentioned. The group is called Middle Islands, and can be passed on either side.

From Rock Harbor to White Fish Point SEbyE $\frac{1}{2}$ E 188 miles.

Michigan or Passage Island Lighthouse.

On the southwest point of Michigan Island, the most southern and eastern of the Apostle group, Wisconsin. Is a fixed white light, visible 19 miles, 129 feet above lake level; a stone tower, connected

with a stone dwelling by a covered way, a guide through the passage between Madeline, Stockton, and Michigan Islands, to Bayfield and LaPoint. Bearings; southwest point of Stockton Island, NW by W $\frac{7}{8}$ W, $6\frac{1}{2}$ miles. Northeast point of Madeline Island, SW by W, 3 miles. Ontonagon light, E $\frac{1}{2}$ S, 56 miles.

La Point Lighthouse.

On Chagwaumegon Point, the southeastern entrance to La Point Harbor, and to the southward of Bayfield. A fixed red light, visible $12\frac{1}{2}$ miles, 42 feet above lake level; on keeper's frame dwelling, painted white; a guide to Bayfield and La Point. Bearings, Carp River, E $\frac{1}{4}$ N, 42 miles.

Chagwaumegon Bay.

From Bayfield to the head of the bay. When opposite Bayfield and clear of the dock, steer south, $4\frac{3}{4}$ miles to a point one mile NW of La Point Lighthouse, when steer SW by S $\frac{3}{4}$ S, for seven miles; thence $3\frac{1}{2}$ miles south to Bay City dock, or Ashland.

From York Island to Duluth Canal.

When York Island bears south steer W by S $\frac{1}{2}$ S, to entrance to Duluth Harbor 60 miles.

Raspberry Island Lighthouse.

On the southwest point of Raspberry Island. The last island you leave on your starboard hand going through the passage. Light fixed, varied by white flashes; time between flashes, 1 minute 30 seconds, visible $15\frac{1}{2}$ miles; 77 feet above lake level; light on keeper's frame dwelling, painted white; a guide between the Main and Raspberry Island and to Bayfield and La Point. Bearings: Two Island River, N by W, 37 miles; Baptism River NW $\frac{1}{4}$ W, $30\frac{1}{2}$ miles.

Courses and Distances on Lake Superior.

From White Fish Point to Manitou Island WNW 24 miles; thence W by N $\frac{1}{2}$ N 100 miles, to Manitou Island Lighthouse. SW $\frac{3}{4}$ of a mile from the lighthouse you will find 15 fathoms water, mud bottom, close in.

From White Fish Point to the Carabou Island NW 55 miles.

From Carabou Island to Small Lake Harbor, Ont., NW $\frac{1}{4}$ N 117 miles. Good holding ground under Carabou Island in 5 to 6 fathoms, clay and sand.

From White Fish Point to the east side of Michipicoten Island NW by N $\frac{3}{4}$ N 75 miles; to the copper mines on the south side of the island NW $\frac{3}{4}$ N 73 miles.

From White Fish Point to Michipicoten River, N by W 60 miles, to Cape Gargantua; thence N by E 20 miles; thence ENE 7 miles, to the river. This river is navigable for boats 15 miles, to the falls.

From White Fish Point to Montreal River, Ont., N by E $\frac{1}{2}$ E 35 miles. This river is 20 fathoms wide, with 5 to 6 feet water over the bar.

From Michipicoten to the Manitou Island Lighthouse WSW 105 miles (from the north side).

From Manitou Island to Stanard's Rock SE $\frac{3}{4}$ S 20 miles; thence same course to Grand Island, 51 miles.

From Point Keweenaw to Granite Island S by E $\frac{1}{4}$ E 50 miles.

From Ford du Lac or Minnesota Lighthouse to Isle Royal NE by E $\frac{1}{2}$ E 145 miles.

From Eagle Harbor to the outer island of the Apostles W by S $\frac{1}{4}$ S, and to clear all the islands W by S, 107 miles.

From Ontonagon to Grand Portage or Pigeon River N by W $\frac{1}{4}$ W 72 miles.

From Eagle Harbor to Rock Harbor NNW $\frac{1}{4}$ W 40 miles.

From White Fish Point to Point Iroquois Lighthouse SE 25 miles. Note the difference in return course.

Minnesota Point Lighthouse.

At the head of Lake Superior, mouth of St. Louis River, three eighths of a mile northwest of the piers. A fixed white light, visible 13 $\frac{1}{2}$ miles, 50 feet above lake level; brick tower, with brick dwelling attached; a guide in Superior Bay. Bearings: Knife River, NE by N, 20 miles; Poplar River, E by S $\frac{1}{8}$ S, 10 miles.

From Duluth to Silver Island Landing.

When off Duluth Lighthouse, steer NE by E, for 171 miles, till the highest peak on west end of Pie Island bears NW 7 miles distant;

when steer NE $\frac{3}{4}$ N 11 $\frac{1}{2}$ miles, till Thunder Cape Light bears NW 1 $\frac{1}{2}$ miles distant; when a NE by E course leads you to the landing, 5 $\frac{2}{3}$ miles distant. Range lights on dock.

Duluth Lighthouse.

On the outer end of the south pier, at the entrance to the canal, at Duluth, Minn. Fixed red light, visible 12 $\frac{1}{2}$ miles, 40 feet above lake level, on open frame structure; a guide to vessels entering the harbor; on entering the harbor, give the end of the west pier a berth of at least 20 feet to avoid stone ripping. This harbor is easy of access. To go in range the piers and run through the center of the channel, keep straight on to the railroad dock or round to the city docks, or come to anchor.

Isle Royal Lighthouse on Menagerie Island.

Entrance to Siskiwit Bay, Isle Royal. Fixed white light visible 15 $\frac{1}{2}$ miles, 75 feet above lake level, arc illuminated, enure horizon; a lake light on an octagonal tower, connected by a crossway with a dwelling house one and one-half stories high; tower white, the dwelling dark brown, and serves to guide into Siskiwit Bay. To enter this bay, from the lighthouse on Menagerie Island, to the main land, the water is deep, and the distance is 2 $\frac{1}{2}$ miles; haul round the light, at the distance of $\frac{1}{2}$ to $\frac{3}{4}$ miles, and run up the bay about SW. The dock is on the starboard side of the bay. The distance from the light to the extreme end of the bay is 11 $\frac{1}{2}$ miles.

McCargose Cove is 36 miles from the Rock of Ages, off Washington Harbor, at the SW end of Isle Royal, and 16 miles from Silver Island.

Todd's Harbor is 8 miles SW of McCargose Cove, NW side of Isle Royal.

Rock Harbor, Isle Royal.

Lighthouse on the west side of the entrance to Rock Harbor, about 12 miles to the eastern extremity of the island. Fixed light, visible 15 miles, 70 feet above lake level; the structure is a tower of mixed stone and brick, of a light drab color, a guide into the harbor. Bearings; Eagle Harbor light, SE by S $\frac{3}{4}$ S, 48 miles; southwest Point of Michipicoten Island (Canada), E by S, 125 miles. To enter Rock

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Harbor: Rock Harbor is 12 miles from Blake's Point; there is a deep passage from the harbor, inside a number of small islands, with two or three passages into the lake, besides the one leading into Rock harbor. Excellent holding ground in the harbor, SW of the lighthouse, in 10 to 15 fathoms; to run in you leave the light to port and a cluster of islands to starboard; the channel is plain to be seen in daylight.

Harbors and Anchorages.

Rock harbor is a most excellent harbor, affording protection in all winds, with good holding ground.

In Siskiwit Bay protection will be found in all winds except from the northeast, with good holding ground $1\frac{1}{2}$ miles south of Wright's Island.

Washington and Grace Harbors are good giving protection in all except southwest winds, with generally good holding ground.

Todd's Harbor will afford good protection except in northerly winds, but care should be taken to avoid the 1 foot spit in the middle of the harbor.

Tobin's Harbor gives protection in all winds, with good holding ground, but will admit only vessels of small dimensions on account of its narrow entrance.

Good lees can be found in the many bays and channels around the northeast end of Isle Royal.

Grand Portage, Waus-wau-go-ing and Pigeon Bays afford good protection in northerly and westerly winds with excellent holding ground.

Dangers to be avoided.

The 6 and 12 feet shoals $\frac{1}{2}$ and 1 mile to the southwest and south of Rock of Ages should be avoided; also the 8 and 14 feet spits, one mile northwest of Rock of Ages should not be approached without due caution.

The south coast of Isle Royal from Siskiwit Bay to the most southern point of Isle Royal should not be approached nearer than two miles from shore, as it abounds in ledges and rocky spots, rendering this coast very dangerous.

Three foot spit $\frac{3}{4}$ mile SW from Washington Island near the entrance to Grace Harbor.

The coast from Washington Harbor to McCargoe's Cove shows some detached rocks from $\frac{1}{4}$ to $\frac{1}{2}$ a mile from shore.

Three foot spit $\frac{3}{4}$ of a mile WSW of Canoe Rocks.

Five foot shoal one mile east of Blake's Point.

The 9 feet reef $2\frac{1}{2}$ miles WNW of Gull Islands should be avoided, also the 1 and 3 feet spits, $\frac{1}{2}$ a mile south of Gull Islands.

Three foot spot $\frac{1}{3}$ of a mile east of Batteau Rock.

Foul ground within $\frac{1}{2}$ a mile around Wright's Id. in Siskiwit Bay.

From Fourteen Mile Point to La Point Lighthouse, a spit extends from Fourteen Mile Point over half mile to the northward, but the rest of the coast may be approached with safety within half a mile.

Chagwaumegon Bay.

In the bay the 12 feet water curve extends two miles westward of Oak point; Bay City can be approached within $\frac{1}{2}$ of a mile, and Ashland within half a mile. From Bayfield to Point Detour, opposite Raspberry Island light, the water is deep close in.

From the SW point of Mageline Island.

A 4 foot spit extends in a southeasterly direction for half a mile, and from the NE point of the same island, a spit extends half a mile towards the east. Two dangerous spots lie $\frac{1}{3}$ of a mile south of Michigan Island Light; shallow spots are one mile north of Outer Island. Rocky Island and South Twin Island are connected by shoal water; north Twin Island has a spit extending half a mile in a southwesterly direction. York Island has a spit extending half a mile to the south, and the passage between Sand Island and the Main shore ought not to be attempted by vessels drawing more than 6 feet water.

From Detour Station to Duluth Lighthouse, Pigeon Point and Isle Royal.

The whole coast of main shore can be approached with safety within one third of a mile. At Isle Royal are many detached rocky shoals lying SSW and NW from Rock of Ages, $1\frac{1}{4}$ miles distant; there are also detached rocky shoals SW and north of Washington Island, which must be carefully avoided, going in and out of Washington Harbor.

From White Fish Point to Grand Island Harbor.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer W $\frac{1}{2}$ S for 56 $\frac{1}{2}$ miles, until Point au Sable bears south 2 miles; thence SWbyW $18\frac{1}{2}$ miles to abreast of Grand Portal, when steer SW for the harbor, leaving the beacon light on Grand Portal 300 yards to starboard, until the southeastern point of the island is passed; thence into the bay.

From White Fish Point to Marquette.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer W $\frac{1}{2}$ S 56 $\frac{1}{2}$ miles, to abreast of Point au Sable Lighthouse, bearing south 2 miles; thence WbyS 60 miles, passing 5 miles north of Grand Island Lighthouse.

From White Fish Point to Portage Entry.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer W $\frac{1}{2}$ N 145 miles, until West Huron Island Lighthouse bears south $1\frac{1}{2}$ miles; thence W $\frac{1}{4}$ S 20 miles, to abreast of Portage River Lighthouse, $\frac{1}{4}$ of a mile from the entrance to Portage River and Lake. Range the light at entry and run in.

From White Fish Point to Mendota or Lac La Belle.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer WbyN $\frac{1}{2}$ N 146 miles, passing four miles to the north of the day beacon on Stanard's Rock, where a lighthouse is now building. Noting that Mt. Bohemia lies on the range until Mendota Light bears west, when you run for the cut, 2 miles distant.

From White Fish Point to Copper Harbor.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer W byN $\frac{3}{4}$ N 145 miles, passing $1\frac{1}{2}$ miles north of Manitou Island Lighthouse, until abreast of Copper Harbor Light, and on line of range lights for entering the harbor; when run in by them, until you pass the rocks which make down from the westward; then haul up the bay midway between the said rocks and the mainland; when past the first point on your port hand, run straight up the bay to the docks. The channel at the turning point is 3 to 4 fathoms.

From White Fish Point to Rock Harbor, Isle Royal.

When $1\frac{1}{2}$ miles north of White Fish Point Lighthouse, steer NW by W $\frac{1}{2}$ W $192\frac{1}{4}$ miles, for the old lighthouse building, to a point $\frac{1}{3}$ of a mile SE by E $\frac{1}{2}$ E from the same, and 1 mile north from the shore, extending from the west: thence NW, keeping the eastern point of the small island, laying to the SE from the lighthouse, about 100 yards off.

From Grand Island to Marquette.

When in line of the range lights S by E $\frac{1}{2}$ E, and due west of Grand Island Lighthouse, (or the northwestern point of the island), steer W $\frac{1}{4}$ S 30 miles to Marquette.

From Marquette to Portage Entry.

When one mile east of Marquette Lighthouse, steer north $4\frac{1}{2}$ miles, until the northern point of Presqu'ile bears SW 2 miles, keeping a lookout for the rocks extending $\frac{3}{8}$ of a mile east from the north end of Presqu'ile; when steer NW $\frac{1}{2}$ N 22 miles, until Big Bay Point bears SW 2 miles; thence NW by W $\frac{3}{4}$ W 18 miles, until Huron Island Lighthouse bears south $1\frac{1}{2}$ miles; thence W $\frac{1}{4}$ S 20 miles to Portage Entry Lighthouse, $\frac{3}{4}$ mile distant.

From Marquette to Manitou Island Passage.

When one mile east of Marquette lighthouse steer north $4\frac{1}{2}$ miles until the north point of Presque Isle bears SW 2 miles; thence N by W $\frac{1}{2}$ W $57\frac{1}{2}$ miles, leaving Granite Island lighthouse half a mile west, until Gull Rock lighthouse bears NE $1\frac{1}{2}$ miles distant; then shape your course along shore for Copper Harbor.

From Portage River to Manitou Passage.

When 2 miles ESE from Portage Point lighthouse steer NE $\frac{1}{4}$ E 45 miles to a point in midchannel $1\frac{1}{2}$ miles from Gull Rock Island lighthouse, and run through the passage.

From Manitou Passage to Ontonagon and Intermediate Points.

When $1\frac{1}{2}$ miles SW from Gull Rock lighthouse follow around the coast, at a distance of one mile, for 33 miles, to a point bearing NW

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from Eagle River lighthouse, distant 2 miles; thence SW $\frac{3}{4}$ W to abreast of Ontonagon harbor. Range the piers and run in depth of water 11 feet and variable.

From Copper Harbor to Rock Harbor, Isle Royal.

When one mile north of Copper Harbor lighthouse, and on the line of the range lights, steer NW $\frac{1}{2}$ N 53 miles, to a point SE by E $\frac{1}{2}$ E, $\frac{1}{3}$ of a mile from the old lighthouse building on Isle Royal, and 1 mile north from the shore extending west, when steer NW, keeping the eastern end of the small island laying SE from the old lighthouse building about 100 yards off.

From Eagle Harbor to Rock Harbor.

When north of Eagle Harbor lighthouse, and in line of the target and the cleft in rock, steer NNW 47 miles to the point as above.

From Eagle River to Rock Harbor, Isle Royal.

When miles north of the dock at Eagle River, steer N by W $\frac{1}{2}$ W 46 miles, to a point as above.

From Ontonagon Round Isle Royal to Rock Harbor.

When clear of Ontonagon Harbor steer N $\frac{1}{4}$ W 67 $\frac{1}{2}$ miles, until Rock of Ages bears due east 3 miles; thence NE by E 48 miles, until the southern point of Passage Island bears east, when steer due east 3 miles, until Blake's Point bears S by W, then steer due south 3 miles, keeping sharp lookout for the spot with five feet water on it, laying $\frac{3}{4}$ mile east from Blake's Point, until Rock Harbor is fairly opened; thence run up and into the harbor as above described.

Dangers.

Near Grand Island, opposite the Beacon Light, of Grand Island, a sandy spit, from Sand Point to the north, and $\frac{1}{3}$ of a mile to the NW, with but 5 feet water.

From the southwest point of Grand Island there extends a sand spit in a SW direction, for almost half a mile, with 5 feet water. There are numerous rocks and sand spits between the south point of Williams' Island and the main shore to the south of it, on which there are but 8 and 10 feet water, making it dangerous for vessels drawing over 8 feet to attempt to pass between Williams' Island and the main shore.

From Grand Island to Point Abbaye there are spits extending from Laughing Fish Point and Shot Point, both in a northern direction, for half a mile; east from Marquette lighthouse $\frac{1}{4}$ mile are rocks and shoal water; $\frac{3}{8}$ of a mile from the northern end of Presque Isle are rocks running parallel with the coast. A spit extends half a mile to the north from a point one mile east from Little Iron River. From Big Bay Point a dangerous spit, with only 8 feet water, extends one mile to the north. A large shoal extending $1\frac{1}{2}$ miles NE from Huron River Point, has to be carefully avoided, as also a 7 feet shoal lying 2 miles east from Point Abbaye.

From Point Abbaye to Keweenaw Point.

From Pequa-quaw-ming Point extends a spit to the SW. A flat fills up most of the bay of Portage Entry. Shoal water extends for a mile to the south, to the east and to the north from Point Isabelle. There is a 3 foot spot a quarter of a mile south of Keweenaw Point.

From Keweenaw Point to Ontonogan.

A rocky flat extends from Manitou Island to Gull Rock lighthouse, and for half a mile to the NW. From Eagle Harbor to Eagle River a succession of reefs extends along the coast in a southwestern direction, from $\frac{1}{8}$ to $\frac{3}{4}$ of a mile distant. One mile north of Portage is a spit extending $\frac{1}{2}$ mile to the north. From Fourteen Mile Point also extends a spit to the north for $\frac{1}{2}$ a mile.

Isle Royal and Vicinity.

There are many detached rocks lying SW, south and NE from Washington Island, which must be carefully avoided going in or out from Washington Harbor or Grace Harbor. Siscowit Bay has a double set of islets, stretching for 8 miles in the general direction of the south shore of the island, connected by hidden reefs, and having also some reefs outside of the islets. No attempt ought to be made to enter between these islets. The north shore of Isle Royal can be approached with safety within half a mile in the general direction of the coast. There is a reef $\frac{1}{2}$ a mile south of Gull Island, and a dangerous spot lies $\frac{1}{3}$ of a mile east from Batteau Rock. East from Blake's Point, $\frac{3}{4}$ of a mile distant, is a 5 foot spot, for which a sharp lookout has to be kept in entering or leaving the eastern entrance of Rock Harbor.

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Canada Side of Lake Superior.

Corbay Point, Bachewana Bay, 40 miles above the Soo Canal, a fixed white light, visible 20 miles, height of tower, 63 feet, height of land, about 46 feet. Tower octagonal, wood, with dwelling attached.

Michipicoton Island Lighthouse.

On South Point, fixed white, visible 18 miles, 56 feet above lake level, white square wooden tower. A fog bell is placed at this station.

Agate Island Lighthouse.

In Quebec Harbor, near Michipicoton Harbor, a guide to enter the harbor. Tower, white square wood, visible 10 miles, 32 feet above lake level.

Battle Island Lighthouse, entrance to Nepigon Bay, in course of construction.

Lamb Island Lighthouse, entrance to Nepigon Bay, in course of construction.

Porphyry Point.

Entrance to Black Bay, Edward Island, Algoma, a fixed white light, visible 16 miles, 56 feet above lake level. This light is for general purposes of navigation, and for guiding vessels to Silver Island and Black Bay.

From White Fish Point to Cape Thunder.

And to Fort William, NWbyW $\frac{1}{4}$ W, 189 miles, to Blake's Point, bearing SbyW 3 miles. Thence Wby N $28\frac{1}{4}$ miles, to Cape Thunder light, bearing N E 2 miles; thence NW 20 miles, to Prince Arthur's Landing. If bound to Fort William, run on your NW course $10\frac{1}{2}$ miles, till the north end of East Welcome Island bears west 2 miles; thence WbyN $3\frac{1}{4}$ N, 5 miles, or until you drop into $2\frac{1}{2}$ fathoms water,

then bring the lights in range at the mouth of Kaministiquia River, and run in on range until the river is entered, leaving a sunken crib outside, to starboard, with a red flag on it. Eleven feet over bar and plenty of water up river.

Prince Arthur's Landing.

Is 3 miles from Fort William and 20 miles NW from Cape Thunder light, has an excellent dock running out from the town ESE and WNW, with an angle to the same running NNE and SSW, with the corner squared off. There are 3 lights—green close in shore on the pier, and red on the corner of the ESE pier, and a white light on the end of the NNE pier. In running for the landing, bring the red and green lights in range, and run up to the pier; 14 to 16 feet water. This is one of the best constructed wooden piers in the country, and the town is quite a lively place.

Cape Thunder Lighthouse, Algoma.

This light is on the low point under the cape, which is 1,350 feet high. Is a flash light, visible 12 miles, 45 feet above lake level, and is a white, square tower. Hare Island lies 2 miles NW from Cape Thunder lighthouse. You leave it to starboard 2 miles, on your course to the landing.



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Life Saving Stations.

On the Coast of Lake Ontario.

Mexico Bay, about seven miles westward of Stony Point, a complete life-saving station; Mexico Bay, about seven miles eastward of Nine Mile Point, a complete life-saving station; Oswego, a life-boat station; Charlotte, a life-boat station.

On the Coast of Lake Erie.

Buffalo, a life-boat station; Presqu'ile, a complete life-saving station; Fairport, a life-boat station; Cleveland, a life-boat station; Marblehead, (Sandusky,) a life-boat station.

On the Coast of Lake Huron.

Point aux Barques, a complete life-saving station; Tawas, a complete life-saving station; Sturgeon Point, a complete life-saving station; North Point, Thunder Bay, a life-boat station; Forty Mile Point, a complete life-saving station; Old Point au Barques, near Port Austin, a complete life-saving station; Middle Island, a complete life-saving station; Sand Beech, a life-boat station.

On the Coast of Lake Michigan.

Beaver Island, a life-boat station; North Manitou Island, a life-boat station; Point aux Bec Scies, a complete life-saving station; Grand Point au Sauble, a complete life-saving station; Grand Haven, a life-boat station; Saint Joseph's, a life-boat station; Chicago, a life-boat station; Grosse Point, a complete life-saving station; Racine, a life-boat station; Milwaukee, a life-boat station; Sheboygan, a life-boat station; Twin Rivers Point, a life-boat station; Sleeping Bear Point, a complete life-saving station; Bayley's Harbor, a complete life-saving station; Kenosha, a life-boat station; Muskegon, a life-boat station.

On the Coast of Lake Superior.

Between White Fish Point and Point au Sauble, four complete life-saving stations.

NOTE — A red coston light is used at the stations, to let those on board a wreck know that their peril is understood, also by building a fire on shore indicates the same. At each of the houses of refuge, the nature of the coast not requiring the usual life-saving appliances, a keeper is only employed, who resides there with his family. These houses are furnished with accommodations and provisions for the succor and maintenance of persons cast ashore, until they are able to leave the station.



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Explantion of Nautical Terms.

ABACK; the situation of the sails when their surfaces are pressed aft against the mast by the force of the wind.

Abaft, or aft; the sternmost part of the ship. *Carry aft anything*; that is, carry towards the stern. *The mast rakes aft*; that is hangs towards the stern. "*How cheer ye fore and aft?*" that is, how fares all the ship's company?

Abaft the beam, denotes the relative situation of any object with the ship, when the object is placed in a part of that arc of the horizon which is contained between a line at right angles with the keel, and that point of the compass which is directly opposite the ship's course. See *Bearing*.

Aboard; the inside of a ship. "*Aboard the main tack!*" the order to draw the lower corner of the mainsail down to the chess-tree.

About; the situation of a ship as soon as she has tacked, or changed her course.

"*About ship!*" the order to the ship's crew to prepare for tacking.

Abreast; the situation of two or more ships, lying with their sides parallel, and their heads equally advanced; in which case they are abreast of each other.

Adrift; the state of a ship broken from her moorings, and driving about without control.

Afloat; buoyed up by the water from the ground.

Afore; all that part of a ship which lies forward, or near the stem. It also signifies *farther forward*.

After; a phrase applied to any object in the hinder part of the ship, as the *after-hatchway*, the *after-sails*, etc.

Aground; the situation of a ship when her bottom, or any part of it, rests on the ground.

Ahead; anything which is situated on that point of the compass to which a ship's stem is directed, is said to be *ahead* of her. See *Bearing*.

A-hull; the situation of a ship when all her sails are furled, and her helm is lashed to the lee side; by which she lies nearly with her side to the wind and sea, and her head being somewhat inclined to the direction of the wind.

A-lee; the position of the helm when it is put down to the lee side.

All in the wind; the state of a ship's sails when they are parallel to the direction of the wind, so as to shake or shiver.

"*All hands ahoy!*" the call by which all the ship's company is summoned upon deck.

Aloft; up in the tops, at the mast-heads, or anywhere above the higher rigging.

Alongside; side by side, or joined to a ship, wharf, etc.

Along shore; along the coast; a course which is in sight of the shore, and nearly parallel to it.

Aloof; at a distance. *Keep aloof*; that is, keep at a distance.

Amain; the old term for *yield*, used by a man-of-war to an enemy; but it now signifies anything done suddenly, or at once, by a number of men.

Amidships; the middle of a ship, either with regard to her length or breadth.

Anchor; the instrument by which a ship is held. *The anchor is foul*; that is, the cable has got about the fluke of the anchor. *The anchor is a peak*; that is, directly under the hawse-hole of the ship. *The anchor is a cock-bill*; that is, hangs up and down the ship's side.

An-end; the position of any mast, etc., when erected perpendicularly on the deck. The top-masts are said to be *an-end* when they are hoisted up to their usual station.

A-peak; perpendicular to the anchor, the cable having been drawn so tight as to bring the ship directly over it. The anchor is then said to be *a-peak*.

Ashore; on the shore, as opposed to *aboard*. It also means *aground*.

Astern; any distance behind a ship, as opposed to *ahead*. See *Bearing*.

At anchor; the situation of a ship riding by her anchor.

Athwart; across the line of a ship's course. *Athwart hawse*; the situation of a ship when driven by accident across the fore part of another, whether they touch or at a short distance from each other; the transverse position of the former being principally understood. *Athwart the fore-foot*; when any object crosses the line of a ship's course, but ahead of her, it is said to be *athwart the fore-foot*. *Athwart-ships*; reaching, or in a direction, across the ship from one side to the other.

Atrip; when applied to the anchor, it means that the anchor is drawn out of the ground, and hangs in a perpendicular direction, by the cable or buoy-rope. The topsails are said to be *atrip* when they are hoisted up to the mast-head, or to their utmost extent.

"*Avast!*" a term used for *Stop!* or *Slay!* as "*Avast heaving!*" do not heave any more.

Aweigh; the same as *atrip*, when applied to the anchor.

Awning; a shelter or screen of canvas, spread over the decks of ships, to keep off the heat of the sun. *Spread the awning*; extend it so as to cover the deck. *Furl the awning*; that is, roll it up.

TO BACK THE ANCHOR; to carry out a small anchor ahead of the large one, in order to support it in bad ground, and to prevent it from loosening or coming home.

To back astern, in rowing, is to impel the boat with her stern foremost, by means of the oars.

To back the sails; to arrange them in a situation which will occasion the ship to move astern.

To bagpipe the mizzen; to lay it aback, by bringing the sheet to the mizzen shrouds.

To balance; To contract a sail into a narrower compass, by folding up a part at one corner. Balancing is peculiar only to the mizzen of a ship, and the mainsail of those vessels wherein it is extended by a boom.

Bale—Bale the boat; that is, throw the water out of her.

Ballast is either pigs of iron, stones, or gravel, which last is called *shingle ballast*; and its use is to bring the ship down to her bearings in the water, which her provisions and stores will not do. *Trim the ballast*; that is, spread it about, and lay it even. *The ballast shoots*; that is, it shifts, or runs over from one side of the hold to the other.

Bare poles; when a ship has no sail set, she is under *bare poles*.

Barge; a caravel-built boat, that rows with ten or twelve oars.

Batten; a thin piece of wood. *Batten down the hatches*, is to lay battens upon the tarpaulins, which are over the hatches in bad weather, and nail them down, that they may not be washed off.

Beacon, a post or stake erected over a shoal or sand-bank, as a warning to seamen to keep at a distance; also, a signal placed at the top of hills, etc.

Beams, strong pieces of timber, stretching across a ship from side to side, to support the decks, and retain the sides at their proper distance.

"Bear a hand!" make haste, dispatch.

Bearing signifies the point of the compass which any two or more places bear from each other, or how any place bears from the ship by the compass; or it may be said to bear on the beam, abaft the beam, on the bow, the head, or stern, etc.

Bearings of a ship, are that line which is formed by the water upon her sides when she is at anchor, with her proportion of ballast and stores on board. *To bear to*, is to sail into a harbor, etc. *Bear round up*, that is, put her right before the wind. *Bring your guns to bear*, is to point them to the object.

To bear in with the land, is when a ship sails toward the shore.

To bear off, to thrust or keep off from the ship's side, etc., any weight, when hoisting.

Bearing up, or bearing away, the act of changing the course of a ship, in order to make her run before the wind, after she has sailed some time with a side wind, or close-hauled. It is generally performed to arrive at some port under the lee, or to avoid some imminent danger, occasioned by a violent storm, leak, or enemy in sight.

Beating to windward, the making a progress against the direction of the wind, by steering alternately close-hauled on the starboard and port tacks.

To becalm, to intercept the current of the wind, in its passage to a ship, by any contiguous object, as a shore above her sails, a high sea behind, etc., and thus one sail is said to becalm another.

Before the beam, denotes an arc of the horizon comprehended between the line of the beam, which is at right angles to the keel, and that point of the compass on which the ship stems. See *Bearing*.

Belay, to make fast any running rope, as, *Belay the main brace*, or, make it fast.

Bend, to apply to, and fasten; as, *Bend the sails*—apply them to the yards and fasten them. *Unbend the sails*, that is, cast them off, and take them from the yards. *Her sails are unbent*, she has none fixed. *Bend the cable*, make it fast to the anchor.

Beneaped. See *Ncaped*.

Berth; a place; as *the ship's berth*, the place where she is moored.—*An officer's berth*; his place in the ship to eat or sleep in.—*Berth the ship's company*; that is, allot to them their places to mess in.—*Berth the hammocks*; point on which each man's hammock is to hang.

Between decks, the space contained between any two decks of a ship.

Bight of a rope; the double part of a rope when it is folded.—*Bight*; a narrow inlet of the sea.

Bilge; to break.—*The ship is bilged*; that is, her planks are broken in by violence.

Bilge-water is that which, by reason of the flatness of the ship's bottom, lies on her floor, and cannot go to the well of the pump.

Binnacle; a kind of box to contain the compasses in upon deck.

Bitts; very large pieces of timber in the fore part of a ship, round which the cables are fastened when the ship is at anchor.—*After-bitts*; a smaller kind of bitts upon the quarter-deck, for belaying the running rigging to.

To bitt the cable, is to confine the cable to the bitts by one turn under the cross-piece, and another turn round the bitt-head. In this position it may be either kept fixed, or it may be veered away.

Bitter; the turn of the cable round the bitts.—*Bitterend*; that part of the cable which stays within board, round about the bitts, when the ship is at anchor.

Block; a piece of wood with running sheaves or wheels in it, through which the running rigging is passed, to add to the purchase.

Board; to board a ship is to enter it in a hostile manner, to enter a ship.

Board; to make a board is making a stretch upon any tack, when a ship is working upon a wind.—*To board it up*; that is, to turn to windward.—*The ship has made a stern board*; that is, when she loses ground in working upon a wind.

Boatswain; the officer who has charge of all the cordage, rigging, anchors, etc.

Bold-shore; a steep coast, permitting the close approach of shipping.
Bolt-rope; the rope which goes round a sail, and to which the canvas is sewed. The side ropes are called *leach-ropes*; that at the top, the *head-rope*; and that at the bottom, the *foot-rope*.

Bonnet of a sail is an additional piece of canvas, put to the sail in moderate weather, to hold more wind.—*Lace on the bonnet*; that is, fasten it to the sail.—*Shake off the bonnet*; take it off.

Boot-topping; cleaning the upper part of a ship's bottom, or that part which lies immediately under the surface of the water, and daubing it over with tallow, or with a mixture of tallow, sulphur, resin, etc.

Both sheets aft; the situation of a ship sailing right before the wind.

Bow-grace; a frame of old rope or junk, laid out at the bows, stems, and sides of ships, to prevent them being injured by flakes of ice.

Bow-lines; lines made fast to the sides of the sails, to haul them forward when upon a wind, which, being hauled taut, enable the ship to come nearer to the wind.

To bouse; to pull upon any body with a tackle, in order to remove it.

Bowsprit; a large mast or piece of timber which stands out from the bows of a ship.

Boxhauling; a particular method of veering a ship, when the swell of the sea renders tacking impracticable.

Boxing; an operation somewhat similar to boxhauling. It is performed by laying the head sails aback, to receive the greatest force of the wind in a line perpendicular to their surface, in order to turn the ship's head into the line of her course, after she has inclined to the windward of it.

Braces; the ropes by which the yards are turned about, to form the sails to the wind.

To brace the yards; to move the yards, by means of the braces, to any direction required.—*To brace about*; to brace the yards round for the contrary tack.—*To brace sharp*; to brace the yards to a position in which they will make the smallest possible angle with the keel, for the ship to have headway.—*To brace to*; to ease off the lee braces, and round in the weather braces, to assist the motion of the ship's head in taking.

Brails; a name peculiar only to certain ropes belonging to the mizzen, used to truss it up to the mast; but it is likewise applied to all the ropes which are employed in hauling up the bottoms, lower corners, and skirts of the other great sails.—*To brail up*; to haul up a sail by means of the brails, for the more ready furling it when necessary.

To break bulk; to begin to unload a ship.

To break sheer. When a ship at anchor is forced by the wind or current, from that position in which she keeps her anchor most free of herself, and most firm in the ground, so as to endanger the tripping of her anchor, she is said to *break her sheer*.

Breaming, burning off the filth from a ship's bottom.

Breast-fast, a rope employed to confine a ship sideways to a wharf, or to some other ship.

To bring by the lee.—See *To broach to*.

To bring to, to check the course of a ship when she is advancing, by arranging the sails in such a manner that they shall counteract each other, and prevent her from either retreating or advancing.—See *To lie to*.

To broach to, to incline suddenly to windward of the ship's course, so as to present her side to the wind, and endanger her oversetting. The difference between *broaching to* and *bringing by the lee* may be thus defined: Suppose a ship, under great sail, is steering south, having the wind at NNW; then west is the weather side and east the lee side. If, by any accident, her head turns round to the westward, so that her sails are all taken aback on the weather-side, she is said to *broach to*. If, on the contrary, her head declines so far eastward as to lay her sails aback on that side which was the lee-side, it is called *bringing by the lee*.

Broadside, a discharge of all the guns on one side of a ship, both above and below.

Broken-backed, the state of a ship which is so loosened in her frame as to drop at each end.

By the board, over the ship's side.

By the head, the state of a ship when she is so unequally loaded as to draw more water forward than aft.

By the wind, the course of a ship as near as possible to the direction of the wind, which is generally within six points of it.

Bunt-lines, ropes fastened to the foot-rope of square-sails, to draw them up to the middle of the yards for furling.

Buoy, a floating conical cask, moored upon shoals, to show where the danger is; it is also attached to anchors, to show where they lie, in case the cable breaks.

CAP, a strong, thick block of wood, having two large holes through it, the one square, the other round; used to confine the two masts together.

Capsize, overturn.—*The boat is capsized*, that is, overset.—*Capsize the coil of rope*, that is, turn it over.

Capstan, an instrument by which the anchor is weighed out of the ground; used also for setting up the shrouds, and other work where a great purchase is required.

To careen, to incline a ship on one side so low down by shifting the cargo or stores on one side, that her bottom on the other side may be cleansed by breaming.

To carry away, to break; as *A ship has carried away her bowsprit*, that is, has broken it off.

Casting, the motion of falling off, so as to bring the direction of the wind on

either side of the ship, after it has blown some time right ahead. It is particularly applied to a ship about to weigh anchor.

Cat-heads, the timbers on a ship's bows, with sheaves in them, by which the anchor is hoisted, after it has been hove up by the cable.

To cat the anchor, is to hook the cat-block to the ring of the anchor, and haul it up close to the cat-head.

Cat's-paw, is a light air of wind perceived at a distance in a calm, sweeping the surface of the sea very lightly, and dying away before it reaches the ship.

Caulking, is filling the seams of the ship with oakum.

Center. This word is applied to that squadron of a fleet, in a line of battle, which occupies the middle of a line; and to that column, in the order of sailing, which is between the weather and lee columns.

Chains, a place built on the side of a ship, projecting out, and at which the shrouds are fastened, for the purpose of giving them a greater angle than they could have if fastened to the ship's side, and of course giving them a greater power to secure the mast.

Chain-plates, are plates of iron fastened to the ship's sides under the chains, and to these plates the dead-eyes are fastened.

Chapeling, the act of turning a ship round in a light breeze of wind, when she is close-hauled, so that she will lie the same way she did before. This is usually occasioned by negligence in steering, or by a sudden change of wind.

Chase, a vessel pursued by some other.—*Chaser*, the vessel pursuing.

Cheerily, a phrase implying heartily, quickly, cheerfully.

To claw off, to turn to windward from a lee shore, to escape shipwreck, etc.

Clear is variously implied. The weather is said to be *clear* when it is fair and open; the sea coast is *clear* when the navigation is not interrupted by rocks, etc. It is applied to cordage, cables, etc., when they are disentangled, so as to be ready for immediate service. In all these senses it is opposed to *foul*.—*To clear the anchor*, is to get the cable off the flukes, and to disencumber it of ropes, ready for dropping.—*Clear hawse*, when the cables are directed to their anchors without lying athwart the stem. *To clear the hawse* is to untwist the cables when they are entangled by having either a cross, an elbow, or a round turn,

Clew-lines are ropes which come down from the yards to the lower corners of the sails, and by which the corners or clews of the sails are hauled up.

Clew of a sail, the lower corners of square-sails, but the aftermost only of stay-sails, the lower corners being called the *tack*.

To clew up, to haul up the clews of a sail to its yard by means of the clew-lines, etc.

Clinched, made fast, as the cable is to the ring of the anchor.

Close-hauled, that trim of the ship's sails, when she endeavors to make a progress in the nearest direction possible toward that point of the compass from which the wind blows.

To club-haul, a method of tacking a ship when it is expected she will miss stays on a lee shore.

Coasting, the act of making a progress along the sea coast of any country.

To coil a rope, a cable, etc., to lay it round in a ring, one turn or fake over another.

To come home. The anchor is said to *come home* when it loosens from the ground by the effort of the cable, and approaches the place where the ship floated, at the length of her moorings.

Coming to, denotes the approach of a ship's head to the direction of the wind.

Course, the point of the compass upon which the ship sails.—*Courses*, a ship's lower sails; as, the foresail is the *fore course*, the mainsail the *main-course*, etc.—*The ship is under her courses*—that is, has no sail set but the mainsail, foresail, and mizzen.

Coxswain, the person who steers the boat.

Crank.—*The ship is crank*, that is, she has not a sufficient cargo or ballast to render her capable of bearing sail, without being exposed to the danger of oversetting.

Crow-foot, is a number of small lines, spread from the fore parts of the tops, by means of a piece of wood through which they pass, and, being hauled taut upon the stays, they prevent the foot of the topsails catching under the top rim; they are also used to suspend the awnings.

Cun, to direct. *To cun a ship*, is to direct the man at the helm how to steer.

To cut and run, to cut the table, and make sail instantly, without waiting to weigh anchor.

DAVIT, a long beam of timber, used as a crane, whereby to hoist the flukes of the anchor to the top of the bow, without injuring the planks of the ship's sides as it ascends. There is always a davit, of a smaller kind, fixed to the long-boat to weigh the anchor by the buoy-rope.

To deaden a ship's way, to impede her progress through the water.

Dead eyes, blocks of wood through which the laniards of the shrouds are reeved.

Dead-lights, a kind of window shutter for the windows in the stern of a ship, used in very bad weather only.

Dead-water, the eddy of water, which appears like whirlpools, closing in with the ship's stern as she sails on.

Dead-wind, the wind right against the ship, or blowing from the very point to which she wants to go.

Dismasted, the state of a ship that has lost her mast.

Dog-vane, a small vane with feathers and cork, and placed on the ship's quarter for the men at cun and helm to see the course of the wind by.

Dog-watch, the watches from four to six, and from six to eight in the evening.

Doubling, the act of sailing round, or passing beyond a cape or point of land.
Doubling upon, the act of inclosing any part of a hostile fleet between two fires, or of cannonading it on both sides.

Douse, to lower suddenly, or slaken; to strike or haul down; as, *Douse the top-gallant-sails*, that is, lower them.

Down-haul, the rope by which any sail is hauled down, as the jib down-haul.

To drag the anchor, to trail it along the bottom after it is loosened from the ground.

To draw, when a sail is inflated by the wind, so as to advance the vessel in her course, the sail is said to *draw*, and so, *to keep all drawing*, is to inflate all the sails.

Drift, the angle which the line of a ship's motion makes with the nearest meridian, when she drives with her side to the wind and waves, and is not governed by the power of the helm. It also implies the distance which the ship drives on that line.

Driver, a large sail set upon the mizzen-yards in light winds. *Drive—the ship drives*, that is her anchor comes through the ground.

Drop, used sometimes to denote the depth of a sail; *The fore-top-sail drops twelve yards*.

To drop anchor, used synonymously with *to anchor*. *To drop astern*, the retrograde motion of a ship.

Dunnage, a quantity of loose wood, etc., laid at the bottom of a ship, to keep the goods from being damaged.

EARINGS, small ropes used to fasten the upper corners of the sails to the yards.

To ease, to ease away, or to ease off—to slacken gradually; thus they say, *Ease the bow-line, ease the sheet*.

"*Ease the ship!*" the command given by the pilot to the steersman, to put the helm hard a-lee, when the ship is expected to plunge her fore part deep in the water when close-hauled.

To edge away, to decline gradually from the shore, or from the line of the course which the ship formerly held, in order to go more large.

To edge in with, to advance gradually towards the shore, or any other object.

Elbow in the hawse, is when a ship, being moored, has gone round, upon the shifting of the tides, twice the wrong way, so as to lay the cables one over the other. Having gone once wrong, she makes a *cross* in the hawse; and going three times wrong, she makes a *round turn*.

End for end, a term used when a rope runs all out of a block, and is unreeling; or, in coming to an anchor, if the stoppers are not well put on, and the cable runs all out, it is said to have gone out *end for end*.

End on, when a ship advances to a shore, rock, etc., without any apparent possibility of preventing her, she is said to go *end on* for the shore, etc.

Engagement, action or fight.

Ensign, the flag worn at the stern of a ship.

Entering-port, a large port in the side of three-deckers, leading into the middle deck, to save the trouble of going up the ship's side to get on board.

Even keel, when the keel is parallel with the horizon, a ship is said to be upon an *even keel*.

FAIR, a general term for the disposition of the wind, when favorable to a ship's course.

Fair way, the channel of a narrow bay, river or haven, in which ships usually advance in their passage up and down.

Fack, or *fak*, one circle of any rope or cable coiled.

Fag-end, the end of any rope which is become untwisted by frequent use: to prevent which, the ends of ropes are wound round with pieces of twine, which operation is called *whipping*.

To fall aboard of, to strike or encounter another ship, when one or both are in motion. *To fall astern*, the motion of a ship with her stern foremost. *To fall calm*, to become in a state of rest by a total cessation of the wind. *To fall down*, to sail or to be towed down a river nearer towards its mouth.

Falling off, denotes the motion of the ship's head from the direction of the wind. It is used in opposition to *coming to*.

"*Fall not off, or nothing off!*" the command of the steersman to keep the ship near the wind.

Fathom, a measure of six feet.

To fetch away, to be shaken or agitated from one side to another, so as to loosen anything which before was fixed.

Fid, a square bar of wood or iron, with shoulders at one end, used to support the weight of the topmast, when erected at the head of a lower mast.—*Fid for splicing*, a large piece of wood, of a conical figure, used to extend the strands and layers of cables in splicing.

To fill, to brace the sails so as to receive the wind in them, and advance the ship in her course, after they have been either shivering or braced aback.

Fish, a large piece of wood.—*Fish the mast*, apply a large piece of wood to it to strengthen it.

Fish-hook, a large hook, by which the anchor is received and brought to the cat-head; and the tackle which is used for this purpose is called the *fish-tackle*.

To fish the anchor, to draw up the flukes of the anchor towards the top of the bow, in order to stow it, after having been cat-ted.

Flag, a general name for colors worn and used by ships of war.

Flat-aft, the situation of the sails when their surfaces are pressed aft against the mast by the force of the wind.

To flat in, to draw in the aftermost lower corner, or clew, of a sail towards the middle of the ship, to give the sail a greater power to turn the vessel.—*To*

Flat in forward, to draw in the fore sheet, jib sheet and fore-staysail-sheet towards the middle of the ship.

Flaw, a sudden breeze or gust of wind.

Floating, the state of being buoyed up by the water from the ground.

Flood-tide, the state of a tide when it flows or rises.

Flowing-sheets, the position of the sheets of the principal sails when they are loosened from the wind so as to receive it into their cavities more nearly perpendicular than when close-hauled, but more obliquely than when the ship sails before the wind. A ship going two or three points large has *flowing-sheets*.

Fore, that part of the ship's frame and machinery that lies near the stem,—

Fore and aft, throughout the whole ship's length; lengthwise of the ship.

Fore-reach, to shoot ahead, or go past another vessel.

To force over, to shoot a ship violently over a shoal by a great quantity of sail.

Forward, toward the fore part of a ship.

Foul is used in opposition to both *clear* and *fair*. As opposed to *clear*, we say, *foul weather*, *foul bottom*, *foul ground*, *foul anchor*, *foul hawse*. As opposed to *fair*, we say, *foul wind*.

To founder, to sink at sea by filling with water.

To free. Pumping is said to *free* a ship when it discharges more water than leaks into her.

To freshen. When a gale increases, it is said to *freshen*.—*To freshen the hawse*, to veer out or heave in a little cable, to let another part of it endure the stress of the hawse-hole. It is also applied to the act of renewing the service round the cable at the hawse-hole.

Freshen the ballast, divide or separate it.

Fresh way. When a ship increases her velocity, she is said to get *fresh way*.

Full, the situation of the sails when they are kept distended by the wind.

Full and by, the situation of a ship with regard to the wind, when close-hauled, and sailing so as neither to steer too nigh the direction, nor to deviate to leeward.

To furl, to wrap or to roll a sail close up to the yard or stay to which it belongs, and to wind a cord around it to keep it fast.

GAUGE OF THE SHIP, her depth of water, or what water she draws.

To gain the wind, to arrive on the weather side, or to windward of some ship or fleet in sight, when both are sailing as near the wind as possible.

Gammon the bowsprit, secure it by turns of a strong rope passed round it, and into the cutwater, to prevent it from having too much motion.

Gangway, that part of a ship's side, both within and without, by which persons enter and depart.

Garboard streak, the first range or streak of planks laid in a ship's bottom next the keel.

Gasket, the rope which is passed round the sail, to bind it to the yard, when it is furled.

To gather. A ship is said to *gather* on another as she comes nearer to her.

Gimletting, the action of turning the anchor round by the stock, so that the motion of the stock appears similar to that of the handle of a gimlet when employed to turn the wire.

Girt. The ship is *girt* with her cables when she is too tight moored.

To give chase to, to pursue a ship or fleet.

Goose wings of a sail, the clews or lower corners of a ship's mainsail or foresail, when the middle part is furled or tied up to the yard.

Grappling-iron, a thing in the nature of an anchor, with four or six flukes to it.

Grave, to burn off the filth from a ship's bottom.

Gripe of a ship, that thin part of her which is under the counter, and to which the stern-post joins.—*The ship grips*, that is, turns her head too much to the wind.

Grommet, a piece of rope laid into a circular form, and used for large boats' oars instead of rowlocks, and also for many other purposes.

Grounding, the laying the ship ashore, in order to repair her. It is also applied to running aground accidentally.

Ground Tackle, everything belonging to a ship's anchors, and which are necessary for anchoring or mooring, such as cables, hawsers, tow-lines, warps, buoy-ropes, etc.

Ground tier, that is, the tier of water casks which is lowest in the hold, and is among the shingle ballast.

Growing, stretching out; applied to the direction of the cable from the ship toward the anchors; as, *The cable grows on the starboard bow*.

Gunwale, the upper edge of a ship's side.

Gun-room, a division of the lower deck abaft, inclosed with net-work, for the use of the gunner and his stores.

Gybing, the act of shifting any boom-sail from one side of the mast to the other.

HAIL, to call to another ship.

Halliards, the ropes by which the sails are hoisted; as, the *top-sail halliards* or *jib-halliards*, etc.

Handing, the same as furling.

Hard a weather, put the tiller quite up to windward.

Haul, pull.

To haul the wind, to direct the ship's course nearer to the point from which the wind blows.

Hawse-holes the holes in the bows of the ship through which the cables pass.—*Freshen Hawse*, veer out more cable.—*Clap a service in the hawse*, put somewhat round the cable at the hawse-hole to prevent it chafing.—*To clear hawse*, is to untwist the cables where the ship is moored, and has got a foul hawse.—*Athwart Hawse*, is to be across or before another ship's head.

Hawser, a small kind of cable.

Head-fast, a rope employed to confine the head of a ship to a wharf or to some other ship.

Headmost, the situation of any ship or ships which are most advanced in a fleet.—*Head sails*, all the sails which belong to the foremast and bowsprit.

Head sea. When the waves meet the head of a ship in her course, they are called a *head sea*. It is likewise applied to a single wave coming in that direction.

Head to wind, the situation of a ship when her head is turned to the point from which the wind blows, as it must be when tacking.

Head-way, the motion of advancing, used in opposition to *stern-way*.

To heave, to turn about a capstan, or other machine of the like kind, by means of bars, handspikes, etc.—*To heave ahead*, to advance the ship by heaving in the cable or other ropes fastened to an anchor at some distance before her.—*To heave a-peak*, to heave in the cable till the anchor is a-peak. *To heave astern*, to move a ship backwards by an operation similar to that of heaving ahead.—*To heave down*, to careen.—*To heave in the cable*, to draw the cable into the ship, by turning the capstan.—*To heave in stays*, to bring a ship's head to the wind by a management of the sails and rudder, in order to get on the other tack.—*To heave out*, to unfurl or loose a sail; more particularly applied to the staysails; thus we say, loose the topsails, and *heave out* the stay sails.—*To heave short*, to draw so much of the cable into the ship as that she will be almost perpendicularly over her anchor. *To heave tight or taut*, to turn the capstan round till the rope or cable becomes straightened.—*To heave the lead*, to throw the lead overboard, in order to find the depth of water.—*To heave the log*, to throw the log overboard, in order to find the velocity of the ship.—*Heave the capstan*, that is, turn it round with the bars.—*Heave handsomely*, heave gently or leisurely.—*Heave hearty*, heave strong and quick.

Heave of the sea, is the power that the swells of the sea have upon a ship in driving her out, or faster on in her course, and for which allowance is made in the day's work.

Heel or incline.—*She heels to port*, that is, inclines or lays down upon her larboard or left side.

Helm, the instrument by which the ship is steered, and includes both the wheel and the tiller as one general term.—*Helm's-a-lee*, that is the tiller is quite down to leeward.

High and dry, the situation of a ship when so far run aground as to be seen dry upon the strand.

Hitch, to make fast.

Hoist, to haul, sway, or lift up.

Hold, is the space between the lower deck and the bottom of the ship, where her cargo, etc., lie.

To stow the hold, is to place the things in it.

To hold its own, is applied to the relative situation of two ships when neither advances upon the other; each is then said to *hold its own*. It is likewise said of a ship, which, by means of contrary winds, cannot make a progress towards her destined port, but which, however, keeps nearly the distance she had already run.

Home, implies the proper situation of any object; as *To haul home the topsail-sheets*, is to extend the bottom of the topsail to the lower yard, by means of the sheets. In stowing a hold, a cask, etc., is said to *be home*, when it lies close to some other object.

Hulk, a ship without masts or rigging; also a vessel employed in the removal of masts into or out of ships by means of sheers, from which it is called a *sheer hulk*.

Horse, a rope reaching from the middle of a yard to its arms or extremities, for the men to stand on when they are loosing, reefing or furling a sail.

Hull of the ship, the body of it.—*To lay a hull* is to lay to with only a small sail, in a gale of wind.—*To hull a vessel*, is to fire a shot into any part of her hull.

Hull down, is when a ship is so far off that you can only see her masts.—*To hull a ship*, to fire cannon balls into her hull within the point-blank range. *Hull to*, the situation of a ship when she lies with all her sails furled, as in *trying*.

IN STAYS. See *To heave in stays*.

JAMMING, the act of inclosing any object between two bodies so as to render it immovable.

Jeer-blocks, the blocks through which jeers are reeved.

Jeers, the ropes by which the lower yards are suspended.

Jib, the foremost sail of a ship, set upon a boom which runs out upon the bowsprit.

Jib-boom, a spar that runs out upon the bowsprit.

Jolly boat, a small boat.

Junk, old cable, or old rope.

Jury mast, a temporary or occasional mast, erected in a ship in the place of one which has been carried away by accident, etc.

KEDGE, a small anchor with an iron stock.

Keel, the principle piece of timber in a ship, which is usually first laid on the blocks in building.

Keel-haul, to drag a person backwards and forwards under a ship's keel for certain offenses.

Keckled, any part of a cable covered over with old ropes, to prevent its surface from rubbing against the ship's bow or fore-top.

To keep away, to alter the ship's course to one rather more large, for a little time, to avoid some ship, danger, etc.—“*Keep away!*” is likewise said to the steersman who is apt to go to windward of the ship's course.—*To keep full*, to keep the sails distended by the wind.—*To keep hold of the land*, to steer near to or in sight of the land.—*To keep off*, to sail off, or keep at a distance from the shore.—*To keep the land aboard*, the same as *to keep hold of the land*.—*To keep the luff*, to continue close to the wind. *To keep the wind*, the same as *to keep the luff*.

Kelson, a piece of timber forming the interior of the keel, being laid on the middle of the floor timbers immediately over the keel, and serving to unite the former to the latter.

Kentledge, pigs of iron for ballast, laid upon the floor, near the kelson, fore and aft.

Kenk, a sort of twist or turn in a cable or rope.

Knippers, a large kind of plaited rope, which being twisted round the messenger and cable in weighing, binds them together.

Knot, a division of the log-line, answering, in the calculation of the ship's velocity, to one mile.

Kumatage, a bright appearance in the horizon, under the sun or moon, arising from the reflected light of those bodies from the small rippling waves on the surface of the water.

TO LABOR, to roll or pitch heavily in a turbulent sea.

Laden in bulk, freighted with a cargo not packed, but lying loose, as corn, salt, etc.

Laid up, the situation of a ship when moored in a harbor, for want of employ.

Landfall, the first land discovered after a sea voyage. Thus a *good landfall* implies the land expected or desired; a *bad landfall*, the reverse.

Land-locked, the situation of a ship surrounded with land, so as to exclude the prospect of the sea, unless over some intervening land.

Laniards of the shrouds, are the small ropes at the ends of them, by which they are hove taut or tight.

Larboard, the left side of a ship, looking towards the head.—*Port tack*, the situation of a ship when sailing with the wind blowing upon her port side.

Lash, to bind.

“*Launch ho!*” signifies that the object is high enough, and must be suddenly lowered.

Laying the land. A ship which increases her distance from the coast, so as to make it appear lower and smaller, is said *to lay the land*.

Leading wind, a fair wind for a ship's course.

Leak, a chink or break in the sides or bottom of a ship, through which the water enters into the hull.

Lee, that part of the hemisphere to which the wind is directed, to distinguish it from the other part, which is called *to windward*.—*Lee gage*. A ship or fleet to leeward of another is said to have the *lee gage*.—*Lee lurches*, the sudden and violent rolls which a ship often takes to leeward, in a high sea, particularly when a large wave strikes her on the weather side.—*Lee quarter*, that quarter of a ship which is on the lee side.—*Lee shore*, that shore upon which the wind blows.—*Lee side*, that side of a ship, lengthwise, which lies between a line drawn through the middle of her length and the side which is farthest from the point of wind.—*To leeward*, toward that part of the horizon to which the wind blows.—*Leeward ship*, a ship that falls much to leeward of her course when sailing close-hauled.—*Leeward tide*, a tide that sets to leeward.

Lee-way, the lateral movement of a ship to leeward of her course; or the angle which the line of her way makes with a line in the direction of her keel.

To lie along, to be pressed down sideways by a weight of sail in a fresh wind.

Leeches, the borders or edges of a sail.

To lie to, to retard a ship in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immovable with respect to her progressive motion or headway.

Lifts, the ropes which come to the ends of the yards from the mast-heads, and by which they are suspended when lowered down.

Limbers, or *timber holes*, square holes cut through the lower part of a ship's floor timbers, very near the keel; forming a channel for water, and communicating with the pump-well throughout the whole length of the floor.

List, incline.—*The ship has a list to port*, that is, she heels to the larboard.

Log, and *log-line*, by which the ship's path is measured, and her rate of going ascertained.

Log-board, on which are marked the transactions of the ship, which from thence are copied into the log-book every 24 hours.

A long sea, a uniform motion of long waves.

Look out, a watchful attention to some important object or event that is expected to arise. Thus persons on board of a ship are occasionally stationed to *look out* for signals, other ships, for land, etc.

To loom, to appear above the surface either of the sea or the land, or to appear larger than the real dimensions, and indistinctly; as a distant object, a ship at sea, or a mountain. The ship *looms* large, or the land *looms* high.

To loose, to unfurl or cast loose any sail.

To lower, to ease down gradually.

"*Luff*!" the order to the steersman to put the helm towards the lee side of the ship, in order to sail nearer to the wind.

MAST, the upright timber on which the masts and sails are set.

Masted, having all her masts complete.

Mend the service, put on more service.

Messenger, a small kind of cable, which, being brought to the capstan and the cable by which the ship rides made fast to it, purchases the anchor.

To middle a rope, to double it into two equal parts.

Midships. See *Amidships*.

Mirage, an optical phenomenon, arising from an irregular refraction or reflection of the light near the horizon, by which it often happens near the sea coast, that a ship, seen at a distance, appears as if painted in the sky, and not supported by the water. Sometimes the image of the ship is inverted. A similar effect is observed in sandy deserts, as in Egypt, where the blue light of the sky is reflected upwards from the heated sands, which makes the whole plain at a distance appear like a large lake, and the elevated villages appear like islands in this lake.

To miss stays, a ship is said to *miss stays* when her head will not fly up into the direction of the wind, in order to get her on the other tack.

Missenmast, the mast which stands abaft, and from which its rigging and sails are named; as of the sails, *missen*, *missen-topsails*, etc., and so also are the other sails, etc., named from the other masts.

Moor, is to secure a ship with two anchors.

Mooring, securing a ship in a particular station by chains or cables, which are either fastened to an adjacent shore or to anchors at the bottom. *Mooring service*, when a ship is moored, and rides at one cable's length, the mooring service is that which is at the first splice.

Mouse, a kind of ball or knob, wrought upon the collar of the stays.

Muster, to assemble.

To make a board, to run a certain distance upon one tack, in beating to windward. *To make foul water*, to muddy the water by running in shallow places, so that the ship's keel disturbs the mud at the bottom. *To make sail*, to increase the quantity of sail already set, either by unreefing or setting others. *To make the land*, to discover it from afar. *To make water*, to leak.

To man the yard, etc., to place men on the yard, in the tops, down the ladder, etc., to execute any necessary duties.

NARROWS, a small passage between low lands.

Near tides, the tides of the first and last quarters of the moon, which are not either so high, so low or so rapid as spring tides. A ship is said to be *benched* when she has not water enough to take her off the ground, or over the bar, etc.

"*Near!*" or "*No near!*" an order to the steersman not to keep the ship so close to the wind.

Nippers, certain pieces of cordage used to fasten the messenger to the cable in heaving up the anchor.

"*Nothing off!*" a term used by the man at the cun to the steersman, directing him not to go from the wind.

Nun buoy, the kind of buoy used by ships of war.

OAKUM, old rope untwisted and pulled out.

Off and on, when a ship is beating to windward, so that by one board she approaches towards the shore, and by the other stands out to sea, she is said to stand *off and on* shore.

Offing, to seaward from the land. *A ship is in the offing*, that is, she is to seaward, at a distance from the land. *She stands for the offing*, that is, towards the sea.

Offward, from the shore, as when a ship lies aground, and leans towards the sea, she is said to heel *offward*.

On board, within the ship; as, *He is come on board*.

On the beam, any distance from the ship on a line with the beams, or at right angles with the keel. See *Bearing*.

On the bow, an arc of the horizon, comprehending about four points of the compass on each side of that portion to which the ship's head is directed. Thus they say, *The ship in sight bears three points on the starboard bow*; that is, three points towards the right hand, from that part of the horizon which is right ahead. See *Bearing*.

On the quarter, an arc of the horizon comprehending about four points of the compass on each side of that point to which the ship's stern is directed. See *Bearing*.

Open, the situation of a place exposed to the wind and sea. It is also expressed of any distant object to which the sight or passage is not intercepted.

Open hawse, when the cables of a ship at her moorings lead straight to their respective anchors, without crossing, she is said to ride at an *open hawse*.

Orlop, the deck on which the cables are stowed.

Overboard, out of a ship; as *He fell overboard*, meaning he fell out of or from the ship.

Overgrown sea, is expressed of the ocean when the surges and billows rise extremely high.

Overhaul, to clear away and disentangle any rope; also, to come up with the chase; as, *We overhaul her*, that is, we gain ground on her.

Over-rake, when a ship at anchor is exposed to a head sea, the waves of which break in upon her, the waves are said to *over-rake* her.

Overset, a ship is *overset* when her keel turns upwards.

Out of trim, the state of a ship when she is not properly balanced for the purposes of navigation.

PARCEL A ROPE, is to put a quantity of old canvas upon it before the service is put on. *Parcel a seam*, is to lay a narrow piece of canvas over it after it is caulked, before it is payed.

Parliament heel, the situation of a ship when she is made to stoop a little to one side, so as to clean the upper part of her bottom on the other side. See *Boat-topping*.

Parting, being driven from the anchors, by the breaking of the cable.

Pawl, a short bar of wood or iron fixed close to the capstan or windlass of a ship, to prevent those engines from rolling back, or giving way, when they are charged with any great effort.

To pawl the capstan, to fix the pawls so as to prevent the capstan from recoiling during any pause of heaving.

To pay, to daub or cover the surface of any body with pitch, tar, etc., in order to secure it from the injuries of the weather.

To pay away, or pay out, to slacken a cable or other rope, so as to let it run out for some particular purpose.

To pay off, to move a ship's head to leeward.

To peak the mizzen, to put up the mizzen-yard perpendicular by the mast.

Peak. *To ride a stay-peak*, is when the cable and the fore stay form a line. *To ride a short peak*, is when the cable is so much in as to destroy the line formed by the stay-peak. *To ride with the yards a peak*, is to have them topped up by contrary lifts, so as to represent St. Andrew's cross.

Pennant, the long narrow flag worn at the mast-head by all ships of the navy. *Brace pennants* are those ropes which secure the brace-blocks to the yard-arms, and are in general double, so that, in case of one being shot away, the other may secure the yard in its proper position.

Broad pennant, a broad flag, terminating in a point, used to distinguish the chief of a squadron.

Pitching, the movement of a ship, by which she plunges her head and after part alternately into the hollow of the sea.

Point blank, the direction of a gun when leveled horizontally.

Points, a number of plaited ropes made fast to the sails for the purpose of reefing.

Poop, the highest and aftermost deck of a ship.

Pooping, the shock of a high and heavy sea upon the stern and quarter of a ship, when she scuds before the wind in a tempest.

Port, a name given, on some occasions, to the larboard side of the ship; as *The ship heels to port*, *Top the yards to port*, etc.; also, a harbor or haven.

Ports, the holes in the ship's sides from which the guns are fired.

"Port the helm!" the order to put the helm over to the larboard side.

Port-last, the gunwale.

Press of sail, all the sail that a ship can set or carry.

Preventer, an additional rope employed at times to support any other, when the latter suffers an unusual strain, particularly when blowing fresh, or in a gale of wind.

Pudding and dolphin, a larger and lesser pad made of ropes, and put round the mast under the lower yards.

Purchase, any sort of mechanical power employed in raising or moving heavy bodies.

QUARTERS, the respective stations of the officers and people in time of action.

Quartering, distributing the men into different places.—*Quarter-bill*, the list of the ship's company, with their stations for action noticed.

Quarter-wind is when the wind blows in from that part of the horizon situated on the quarter of the ship. See *On the quarter*.

Quoil.—See *To coil the cable*, etc.

TO RAISE, to elevate any distant object at sea by approaching it; thus to *raise the land* is used in opposition to *lay the land*.

To rake, to cannonade a ship at the stern or head, so that the balls scour the whole length of the decks.

Range of cable, a sufficient length of cable drawn upon deck before the anchor is cast loose, to admit of its sinking to the bottom without any check.

Rallines, the small ropes fastened to the shrouds, by which the men go aloft.

Reach, the distance between any two points on the banks of a river, wherein the current flows in an uninterrupted course.

"*Ready about!*" a command of the boatswain to the crew, and implies that all hands are to be attentive, and at their stations for taking.

Rear, the last division of a squadron, or the last squadron of a fleet. It is applied likewise to the last ship of a line, squadron, or division.

Reef, part of a sail, from one row of eyelet-holes to another. It is applied likewise to a chain of rocks laying near the surface of the water.

Reefing, the operation of reducing a sail by taking in one or more of the reefs.

To reeve, to pass the end of a rope through any hole, as the channel of a block, the cavity of a thimble, etc.

Rendering, the giving way or yielding to the efforts of some mechanical power. It is used in opposition to *jamming* or *sticking*.

Ribs of a ship, a figurative expression for the timbers.

Ride at anchor, is when a ship is held by her anchors, and is not driven by wind or tide.—*To ride athwart*, is to ride with the ship's side to the tide.—*To ride hawse fallen*, is when the water breaks into the hawse in a rough sea.

Rigging, a general name given to all the ropes employed to support the masts, to extend or reduce the sails, or to arrange them to the disposition of the wind.

Righting, restoring the ship to an upright position, either after she has been laid on a *carreen*, or after she has been pressed down on her side by the wind.

To right the helm, is to bring it into midships, after it has been pushed either to starboard or larboard.

Rigging out a boom, the running out a pole at the end of a yard, to extend the foot of a sail.

To rig the capstan, to fix the bars in their respective holes.

Road, a place near the land where ships may anchor, but which is not sheltered.

Robands, or *rope bands*, short, flat pieces of plaited rope, having an eye worked at one end. They are used in pairs to tie the upper edges of the square-sails to their respective yards.

Rolling, the motion by which a ship rocks from side to side like a cradle.

Rough tree, a name applied to any mast, yard, or boom, placed in merchant ships, as a rail or fence above the vessel's side, from the quarter deck to the fore-castle.

Rounding in, the pulling upon any rope which passes through one or more blocks in a direction nearly horizontal; as, *Round in the weather-braces*.

Rounding, old ropes fastened on the cable, near the anchor, to keep it from chafing.

Round turn, the situation of the two cables of a ship when moored, after they have been several times crossed by the swinging of the ship.

Rounding up, similar to *rounding in*, except that it was applied to ropes and blocks which act in a perpendicular direction.

Rousing, pulling up a cable or rope without the assistance of tackles.

To row, to move a boat with oars.

Rowlock, the niche in a boat's side, in which the oars are used.

Rudder, the machine by which the ship is steered.

Run, the aftermost part of a ship's bottom, where it grows extremely narrow as the stern approaches the stern-post. *Run* is also the distance sailed by a ship; and is likewise used by sailors to imply the agreement to work a single passage from one place to another.

To run out a warp, to carry the end of a rope out from a ship, in a boat, and fasten it to some distant object, so that by it the ship may be removed by pulling on it.

TO SAG TO LEEWARD, to make considerable lee-way.

Sailing trim is expressed of a ship when in the best state for sailing.

She sands or sends, when the the ship's head or stern falls deep in the trough of the sea.

Scanting, the variation of the wind, by which it becomes unfavorable to a ship's making great progress, as it deviates from being large, and obliges the vessel to steer close-hauled, or nearly so.

Scud, to go right before the wind; and going in this direction without any sail set, is called *spooning*.

Scuttling, cutting large holes through the bottom or sides of a ship, either to sink her, or to unlade her expeditiously when stranded.

Sea, a large wave is so called. Thus they say a *heavy sea*. It implies likewise, the agitation of the ocean; as, a *great sea*. It expresses the direction of the waves; as, a *head sea*. A *long sea* means a uniform and steady motion of long and extensive waves; a *short sea*, on the contrary, is when they run irregularly, broken, and interrupted.

Sea-boat, a vessel that bears the sea firmly, without straining her masts, etc.

Sea-clothes, jackets, trousers, etc.

Sea-mark, a point or object on shore conspicuously seen at sea.

Sea room, a sufficient room distance from the coast or any dangerous rocks, etc., so that a ship may perform all nautical operations without danger of shipwreck.

Seize, to bind or make fast.

Serve, to wind something about a rope to prevent it from chafing or fretting.

The *service* is the thing so wound about the rope.

Setting, the act of observing the situation of any distant object by the compass.

To set sail, to unfurl and expand the sails to the wind, in order to give motion to the ship.

To set up, to increase the tension of the shrouds, back-stays, etc., by tackles, laniards, etc.

Settle, to lower; as, *Settle the topsail halliards*; lower them.

To settle the land, to lower in appearance. It is synonymous with *to lay the land*.

Shank, the beam or shaft of an anchor.

Shank painter, the rope by which the shank of the anchor is held up to the ship's side; it is also made fast to a piece of iron chain, in which the shank of the anchor lodges.

To shape a course, to direct or appoint the track of a ship, in order to prosecute a voyage.

Sheer. The *sheer* of a ship is the curve that is between the head and the stern upon her side.—*The ship sheers about*; that is, she goes in and out.

To sheer off, to remove to a greater distance.

Sheers are spars lashed together, and raised up, for the purpose of getting out or in a mast.

Sheet, a rope fastened to one or both of the lower corners of a sail, in order to extend and retain it in a particular situation. When a ship sails with a side wind, the lower corners of the main and fore-sails are fastened by a *tack* and a *sheet*, the former being to windward, and the latter to leeward. The tack is never used with a stern wind, whereas the sail is never spread without the assistance of one or both of the sheets. The staysails and studdingsails have only one tack and

one sheet each. The staysail-tacks are fastened forward, and the sheets drawn aft, but the studdingsail-tacks draw the outer corner of the sail to the extremity of the boom, while the sheet is employed to extend the inner corner.

To sheet home, to haul the sheets of a sail home to the block on the yard-arm.

To shift the helm, to alter its position from right to left, or from left to right.

To ship, to take any person, goods or things on board. It also implies to fix any thing in its proper place; as, *To ship the oars*, to fix them in their rowlocks.

Ship-shape, in a seamanlike manner; as, *That mast is not rigged ship-shape*; *Put her about ship-shape*, etc.

Shivering, the state of a sail when fluttering in the wind.

Shoal, shallow.

Shoe of the anchor, a small block of wood, convex on the back, and having a hole sufficiently large to contain the point of the anchor fluke on the fore side; it is used to prevent the anchor from tearing the planks on the ship's bow, when ascending or descending.

To shoot ahead, to advance forward.

Shore, a general name for the sea coast of any country.

To shorten sail, used in opposition to *make sail*.

Shrouds, a range of large ropes extended from the mast-heads to the right and left sides of a ship, to support the masts and enable them to carry sail.

Sinnett, a small plaited rope made from rope-yarns.

Slack-water, the interval between the flux and reflux of the tide, when no motion is perceptible in the water.

Slack is applied to the period of a transitory breeze.

To slip the cable, to let it run quite out, when there is not time to weigh the anchor.

To slue, to turn any cylindrical piece of timber about its axis, without removing it; thus, *to slue a mast or boom*, is to turn it in its cap or boomiron. Also to turn any package or cask around.

Sound, to try the depth of water.

Sounding line, a line to sound with, which is marked in the following manner: Black leather at 2 and 3 fathoms; white at 5; red at 7; black at 10; white at 13 (some seamen use black at 10 and 13); white at 15 as at 5; red at 17 as at 7; two knots at 10 fathoms, and an additional knot at every ten fathoms, with a single knot midway between each ten fathoms, to mark the line at every five fathoms.

To spill the mizen, To let go the sheet and peak it up.

To spill, to discharge the wind out of the cavity or belly of a sail, when it is drawn up in the rails, in order to furl or reef it.

Spilling-lines are ropes contrived to keep the sails from being blown away, when they are clewed up in blowing weather.

Splice, to make two ends of ropes fast together by untwisting them and then putting the strands of one piece with the strands of the other.

Split, the state of a sail rent by the violence of the wind.

Spoon-drift, a sort of showery sprinkling of the sea water swept from the surface of the waves in a tempest, and flying like a vapor before the wind.

Spray, the sprinkling of a sea, driven occasionally from the top of a wave, and not continual as a spoon-drift.

To spring a mast, yard, etc., to crack a mast, yard, etc., by means of straining in blowing weather, so that it is rendered unsafe for use.—*To spring a leak*. When a leak first commences, a ship is said *to spring a leak*.—*To spring the luff*. A ship is said *to spring her luff*, when she yields to the efforts of the helm, by sailing nearer to the wind than before.

Spring-stays are rather smaller than the stays, and placed above them, and intended to answer the purpose of the stay, if it should be shot away, etc.

Spring-tides are the tides at new and full moon, which flow highest and ebb lowest.

Spurling line is a line that goes round a small barrel abaft the barrel of the wheel, and, coming to the front beam of the poop-deck, moves the telltale with the turning of the wheel, and keeps it always in such a position as to show the position of the tiller.

Spur-shoes, a large piece of timber which comes abaft the pump-well.

Squall, a sudden, violent blast of wind.

Square. This term is applied to yards that are very long, as *taunt* is to high masts.

To square the yards, to brace the yards so that they may hang at right angles with the keel.

To stand on, to continue advancing.—*To stand in*, to advance towards the shore.—*To stand off*, to recede from the shore.

Starboard, the right-hand side of a ship, when looking forward.—*Starboard tack*. A ship is said to be on the *starboard tack* when sailing with the wind blowing upon her starboard side.

"*Starboard the helm!*" an order to push the helm to the starboard side.

To stay a ship, to arrange the sails and move the rudder so as to bring the ship's head to the direction of the wind, in order to get her on the other tack.

Stays, large ropes coming from the mast-head down before the masts, to prevent them from springing, when the ship is sending deep.

"*Steady!*" the order to the helmsman to keep the ship in the direction she is going at that instant.

Steering, the art of directing the ship's way by the movement of the helm.

Steerage-way, such degree of progressive motion of a ship as will give effect to the motion of the ship.

Stem, a circular piece of timber, into which the two sides of a ship are united

at the fore end; the lower end is scarfed to the keel, and the bowsprit rests on the upper end.

To stem the tide. When a ship is sailing against the tide, at such a rate as to enable her to overcome its powers, she is said to *stem the tide*.

Steeve, turning up.—*The bowsprit steeves too much*, that is, it is too upright.

Sternfast, a rope confining a ship by her stern to any other ship or to a wharf.

Sternmost, the farthest astern, opposed to *headmost*.

Stern-way, the motion by which a ship falls back with her stern foremost.

Stiff, the condition of a ship when she will carry a great quantity of sail without hazard of oversetting. It is used in opposition to *crank*.

Stoppers, a large kind of ropes, which, being fastened to the cable in different places abaft the bitts, are an additional security to the ship at anchor.

To stow, to arrange and dispose a ship's cargo.

Strand, one of the twists or divisions of which a rope is composed. It also implies the sea beach.

Stranded. This term, speaking of a cable or rope, signifies that one of its strands is broken; applied to a vessel, it means that she is run aground and is lost.

To stream the buoy, to let it fall from the ship's side into the water, previously to casting anchor.

"Stretch out!" a term used to men in a boat when they should pull strong.

To strike, to lower or let down anything; used emphatically to denote the lowering of colors in token of surrender to a victorious enemy.

To strike sounding, to touch ground when endeavoring to find the depth of water.

Sued, or *sewed*. When a ship is on shore, and the water leaves her, she is said to be *sued*; if the water leaves her two feet, she *sues* or is *sued* two feet.

Surf, the swell of the sea that breaks upon the shore or on any rock.

To surge the capstan, to slacken the rope heaved round upon it.

Sway away, hoist.

Swell, the fluctuating motion of the sea, either during or after a storm.

Sweeping, the act of dragging the bight or loose part of a rope along the surface of the ground, in a harbor or road, in order to drag up something lost.

Swinging, the act of a ship's turning round her anchor at the change of wind or tide.

To TACK, to turn a ship about from one tack to another, by bringing her head to wind.

Tufferel, the uppermost part of a ship's stern.

Taking in, the act of furling the sails, used in opposition to *setting*.

Taking aback.—See *Aback*.

Tamkin, or *tonkin*; *tampion*, or *tompion*, the bung or piece of wood, by which the mouth of a cannon is filled to keep out wet.

Tarpanlin, a cloth of canvas covered with some tar or some other composition, so as to make it water-proof.

Taut, improperly, though very generally used for *tight*.

Taunt, high, or tall; particularly applied to masts of extraordinary length.

Tell-tale, an instrument which traverses upon an index in front of the poop-deck, to show the position of the tiller.

Tending, the turning or swinging of a ship round her anchor in a tide-way at the beginning of ebb and flood.

Thwart.—See *Athwart*.

Thwart-ships.—See *Athwart-ships*.

"*Thus I*" an order to the helmsman to keep the ship in her present situation, when sailing with a scant wind.

To tide, to work in or out of a river, harbor, or channel, by favors of the tide, anchoring whenever it becomes adverse.

Tide it up, to go with the tide against the wind.

Tide-way, that part of the river in which the tide ebbs and flows strongly.

Tier, a row; as a *tier* of guns, a *tier* of casks, a *tier* of ships, etc.—*Tier of a cable*, a range of the fakes or windings of a cable which are laid within one another, in a horizontal position.—*Cable tier*, the space in the midst of a cable when it is coiled; also the place in which it is coiled.

Tiller, a large piece of wood, or a beam, put into the head of the rudder, and by which means the rudder is moved.

Topping, pulling one of the ends of a yard higher than the other.

Tort, or *tout*, signifies *tight*.

To tow, to draw a ship in the water by a rope, fixed to a boat or other ship which is rowing or sailing on.

Tow-line, a small hawser or rope, used to remove a ship from one part of a harbor to another.

Transoms, certain beams or timbers extended across the stern post of a ship to strengthen her after part, and to give it the figure most suitable to the service for which she is calculated.

Traverse, to go backwards and forwards.

Treenails or *trunnels*, long wooden pins employed to connect the planks of the ship's side and bottom to the corresponding timbers.

Trice, *trice up*, to haul up and fasten.

Trim, the state or disposition by which a ship is best calculated for the purpose of navigation.—*To trim the hold*, to arrange the cargo regularly.

To trim the sails, to dispose the sails in the best arrangement for the course which a ship is steering.

To trip the anchor, to loosen the anchor from the ground, either by design or accident.

Trough of the sea, the hollow between two waves.

Truck, a round piece of wood put upon the top of flag-staves, with sheaves on each side for the halliards of the flags to reeve in.

Trysail, a small sail used by cutters and brigs in blowing weather,

Turning to windward, that operation in sailing, whereby a ship endeavors to advance against the wind.

To UNBALLAST, to discharge the ballast out of a ship.

To unbend, to take the sails off from their yards and stays; to cast loose the anchor from the cable; to untie two ropes.

To unbitt, to remove the turns of a cable from off the bitts.

Under, expressed of an anchor that is directly under the ship.

Under way, When a ship is sailing, she is said to be *under way*.

Under shore, is to be close under the shore which lies to windward of the ship.

Unfurl, cast loose the gasket of the sail.

To unmoor, to reduce a ship to the state of riding at single anchor, after she has been moored.

To unreeve, to draw a rope from out of a block, timber, etc.

To unrig, to deprive the ship of her rigging.

Uprou, the piece of wood by which the legs of the crofoot are extended.

VAN, the foremost division of a fleet in one line. It is likewise applied to the foremost ship of a division.

Vane, a small kind of flag worn at each mast-head.

To veer or wear the ship, to change a ship's course from one tack to the other, by turning her stern to windward.

Veer, to let out; as *Veer away the cable*.

Veer, shift.—*The wind veers*, that is, it shifts, changes.

To veer and haul, to pull tight or slacken alternately.

Viol, or *voyal*, a block through which the messenger passes in weighing the anchor. A large messenger is called a *viol*.

WAKE, the path or track impressed on the water by the ship's passage through it, leaving a smoothness in the sea behind it. A ship is said to come into the *wake* of another, when she follows her in the same track, and this is chiefly done in bringing ships to, or in forming the line of battle.

Wales are strong timbers that go round a ship a little above her water line.

Warp, a small rope employed occasionally to remove a ship from one place to another.

To warp, to remove a ship by means of a warp.

Waist, that part of a ship contained between the quarter-deck and the fore-castle.

Water-line, the line made by the water's edge when a ship has her full proportion of stores, etc., on board.

Water borne, the state of a ship when there is barely a sufficient depth of water to float her off from the ground.

Water-logged, the state of a ship become heavy and inactive on the sea, from the great quantity of water leaked into her.

Water-tight, the state of a ship when not leaky.

Weather.—*To weather* anything is to get to windward of it.—Synonymous with *windward*.

Weather-beaten, shattered by a storm.—*Weather-bit*, a turn of the cable about the end of the windlass.—*Weather-gage*. When a fleet or a ship is to windward of another, she is said to have the *weather-gage* of her.—*Weather-quarter*, that quarter of the ship which is on the windward side.—*Weather-side*, the side upon which the wind blows.

To weigh anchor, to heave up an anchor from the bottom.

To wind a ship, to change her position, bringing her head where her stern was.

Wind-road. When a ship is at anchor, and the wind, being against the tide, is so strong as to overcome its power, and keep the ship to leeward of her anchor, she is said to be *wind-road*.

Wind's eye, the point from which the wind blows.

To windward, toward that part of the horizon from which the wind blows.

Windward tide, a tide that sets to windward.

To work a ship, to direct the movements of a ship by adapting the sails and managing the rudder according to the course the ship has to make.

To work to windward, to make a progress against the direction of the wind.

Wooled, to bind round with ropes.

YARDS, the spars upon which the sails are spread.

Yawing, the motion of a ship when she deviates from her course to the right or left.



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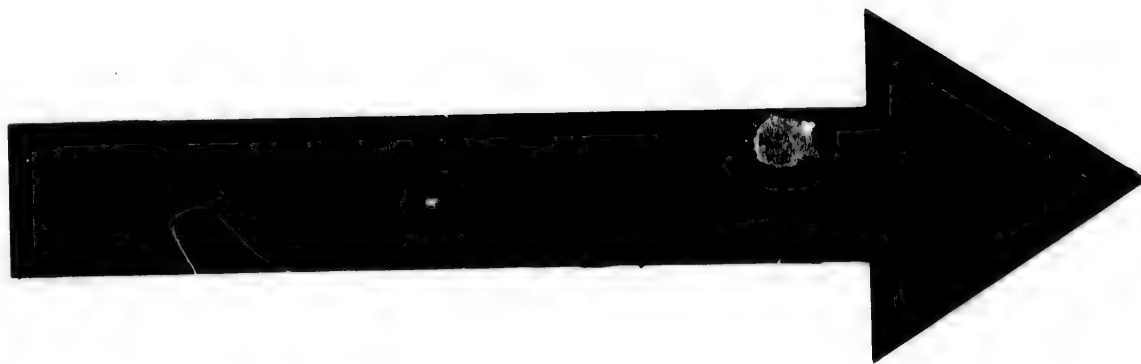
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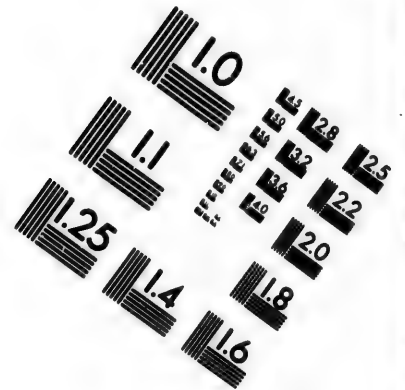
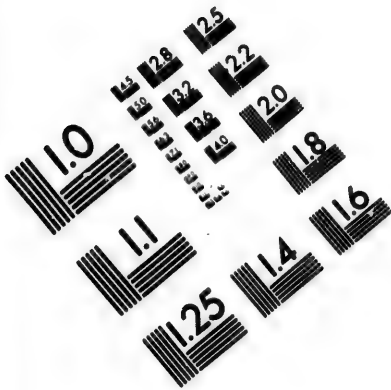
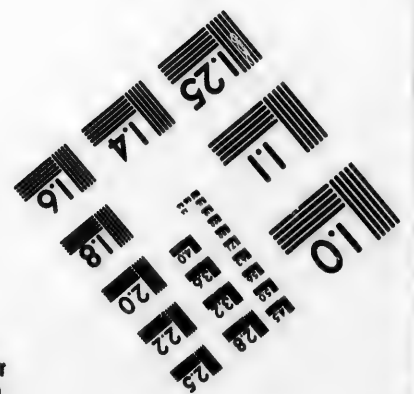
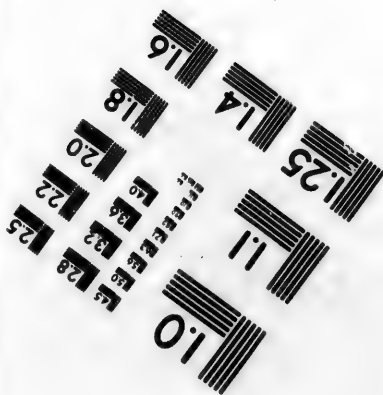
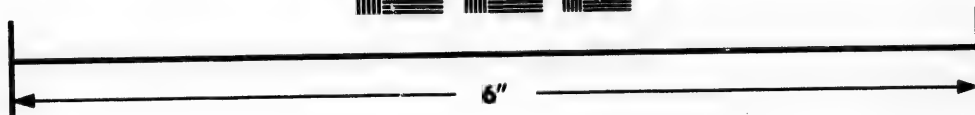
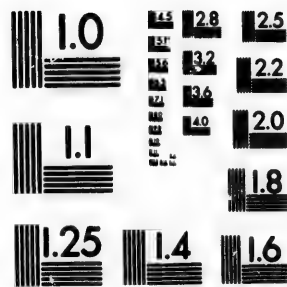


IMAGE EVALUATION TEST TARGET (MT-3)



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INSTRUCTIONS AND DRILL

IN THE USE OF THE

Rocket and Mortar Apparatus.

The rocket and mortar apparatus consists of the following articles :

Articles of rocket apparatus,

Line rockets.
Rocket frame.
Rocket staves.
Rocket pins.
Washers.
Detonating tubes.
Priming wire.
Trigger line.

Articles of mortar apparatus.

5-inch Eprouvette mortar and bed.
Cast-iron balls.
Spiral wires.
Priming wires.
Friction primers.
Tank (6 pounds) best sporting powder.
Powder flask, with shoulder belt.
Match stock, with match rope.
Quick-matches in tin case.

Articles Common to Both.

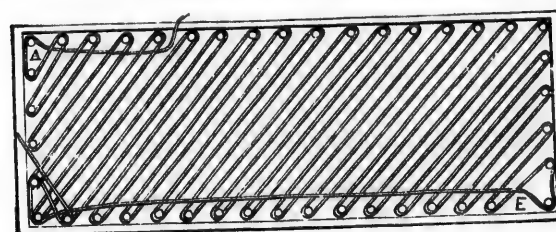
Box hand lights and port-fires.
Haversack.
Hand cart.
Shot or rocket line.
Hawser.
Hauling or whip line rove through a single tail-block.
Double block tackle purchass.
Spare tail-blocks.
Crotch or triangle.

Sand anchor and backer.
Tarpaulin, with tent pegs.
Pickaxe.
Shovel.
Lantern.
Signal flag.
Tally-boards.
Life car.
Breeches buoy.

General Directions.

The line should be first thrown from its box after the frame with the faking pins has been carefully lifted clear of the line. If the first shot fails, the line may be afterwards French-faked on the tarpaulin or along the beach.

The following engraving shows the shot or rocket line faked in the box :

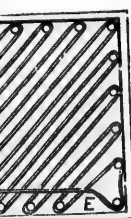


In aiming, due allowance should be made for the force and direction of the wind. Accuracy of aim can only be acquired by frequent practice in throwing the line along the beach in all conditions of wind and weather. The line, whether in its box or faked on the ground, should be placed at least six or eight feet to the windward of the rocket frame or mortar. In firing, care should be taken to stand by the side of, and not behind, the rocket frame or mortar.

When the shot or rocket line is over the wreck and has been seized by those on board, signal should be made, from the ship, in the day time, by some one standing apart from the rest, by waving a flag, handkerchief, hat, or his hand; or, if at night, a rocket, a blue light, or a gun should be fired, or a light should be shown over the ship's side for a short time and then concealed. When this signal is observed on shore, the shore end of the shot or rocket line should be bent on to the whip, around both parts of it, about two fathoms above the tail-block, and signals should be made by the man on shore attending signals standing apart from the rest and waving the signal flag, if in the daytime, or showing a red light for a short time, if at night. When this signal is seen by those on the wreck, they will haul on the shot or rocket line until the whip and tail-block are on board, when they will make fast the tail of the block, as directed by the tally-board attached to the whip, and make signal to the shore as before. At this signal those on shore will haul the hawser, which has, in the meantime, been rove through the rings of the life-car or the block of the traveler attached to the breeches bouy, on board the wreck, by the whip, which has also been previously made fast to the hawser. When the hawser is on board it will be made fast to the wreck, in accordance with the directions on the tally-board attached to it, and disconnected from the whip, and signal will again be made. At this signal (the sand anchor having been securely planted in the beach) the hawser will be

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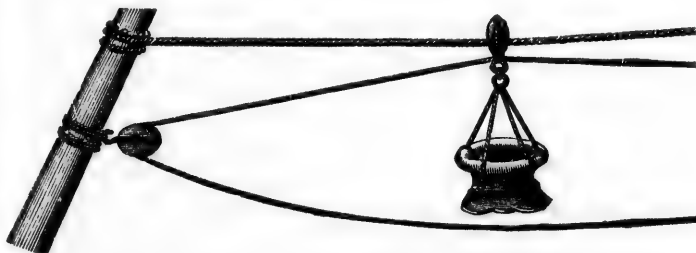


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set up by means of the tackle-purchase, and the whip, having been bent on to each end of the life-car or secured to the bresches box, will be used by the crew on shore to haul the car or buoy off to the wreck. At the next signal from the vessel, indicating that the car or buoy has received its freight, it will be hauled ashore. Those drawn ashore will be duly taken charge of, and the car or buoy returned to and from the vessel until all who can be are saved.

The following illustration shows the method of using the hawser and whip line :



Should the motion of the sea cause the vessel to rock violently, the hawser should not be set up, but should be rove through the block of the triangle and manned with as many men as can be spared, who will haul and veer on it according to the motion of the vessel, keeping the strain as uniform as possible to prevent its being carried away.

Where the wreck happens on a flat shore, or there is imminent danger of the immediate breaking up of the wreck, the hawser should not be set up, but the whip alone should be used, as represented in the following illustration :



Rocket Drill.

The crew should be numbered consecutively 1, 2, 3, 4, 5 and 6, the keeper acting as Captain. If the crew of an adjacent station should be present, the surfmen will form *auxiliary* numbers, 7, 8, 9, 10, 11 and 12, and the keeper will be second in command.

Words of Command.

"Rocket party, fall in." "Form order of march;" (or, if auxiliaries are present, "Form order of march, double.") "Halt." "Action." "Ready." "Fire." "Bend on." "Haul out." "Haul ashore."

"Rocket party, Fall in!"

8, 2, 4, 6, 10, 12.....Rear rank.
1, 3, 5, 7, 9, 11.....Front rank.
Rocket Nos.....1, 2, 3, 4, 5, 6.
Auxiliaries.....7, 8, 9, 10, 11, 12.

Form of Order of March, Double.

In case auxiliaries are not present, the single order of march will be formed by the regular rocket numbers, as above, by No. 6 taking the place of No. 8.

Providing Stores.

[Stores are always to be kept in the cart in a serviceable condition; a list of the stores printed on calico will be posted on the rear end of the cart. The stores are to be carefully examined after use, and put in order; they will also be inspected and aired monthly.]

The rocket numbers will be charged with providing and caring for the stores as follows:

No. 1—Rocket frame, tube box, (containing tubes, primers, washers, and pins for the rockets, priming wire, and trigger line.)

No. 2—Six rockets, box of hand lights and port-fires, six staves, line and box with small stores, (attached to the side of the cart before the wheel.)

No. 3—Rocket line, whip and tally-boards, two tail-blocks, (one on whip and one spare.)

No. 4—Signal flag, lantern, (if at night,) straps, tarpaulin, and eight tent pegs, (tarpaulin to be fitted for pegging down on the beach.)

No. 5—Hawser and tally-boards, snatch-block and triangle.

No. 6—Anchor and packer, tackle, pickaxe, shovel, and life-car or breeches buoy.

The Captain—A flask of spirits from the medicine chest to revive the shipwrecked if necessary.

All auxiliaries are to assist in carrying stores from the cart to point of action.

Duties at the Words of Command, "Halt," "Action."

No. 1 places rocket frames, uncaps and places rocket in frame, points, elevates, primes, sees all clear.

No. 2 assists No. 3 to place box with line six yards to windward and abreast of frame, and with him lifts box clear of pins, places and pins staff to rocket and hands it to No. 1.

No. 3 takes out rocket staves, and, assisted by No. 2, places box with line six yards to windward and abreast of frame, and with him lifts box clear of pins and cants it in the direction of the wreck; wets about three fathoms of end of line, reeves it through staff and puts on two India-rubber washers and a metal one, and then knots end of line securely.

No. 4, assisted by even numbers of auxiliaries, takes the whip and carries it eight yards to the right, rear of frame, and sees it clear for running and bending on hawser.

Nos. 5 and 6, assisted by odd numbers of auxiliaries, take end of hawser and tally to No. 4, and clear it.

Auxiliary No. 7, assisted by No. 9, spreads and pegs down tarpaulin; then attends signals under direction of the Captain. (If there be no No. 7, Captain attends signals.)

No. 8 assists No. 7 and keeps ground clear.

Nos. 9 and 11 assist Nos. 5 and 6, as indicated in directions to them above.

Nos. 10 and 12 assist No. 4, as indicated in direction to him above.

"Ready."

No. 1 sees trigger line clear and cocks the lock or lights port-fire, retiring to the left.

No. 2 attends steadying line.

"Fire."

No. 1 fires with steady pull or with a port-fire, and, if communication is effected, removes the frame. (NOTE.--If rocket fails, Nos. 3 and 4 haul in line; Nos. 1 and 2 take down clear for running; No. 1 corrects the pointing and elevating, and then the party proceed as before.)

"Bend on"--"Haul out."

Nos. 1 and 2 bend shot line on the whip; No. 1 mans hauling part of whip; and No. 2 takes charge of the right side of whip.

Nos. 3 and 4 bend on hawser* and tally about two fathoms from the end, and No. 4 takes charge of left side of whip.

No. 5, assisted by odd numbers of auxiliaries, clears hawser away for hauling off to the wreck, reeves it through rings of life-car or the block of the traveller attached to the breeches buoy; bends on whip to car or buoy.

* In bending on the hawser do not stop the end up with a rope yarn, but leave two or three fathoms hanging loose.

No. 6, assisted by odd numbers of auxiliaries, buries anchor and backer, hooks on takle to anchor, and, securing it to hawser, raises triangle and snatches hawser.

Nos. 9 and 11 assist No. 5 to clear away hawser, keeping a slight strain on it while being hauled off to the wreck, keeping to the left of the whip; man the tackle and veer and haul as necessary.

Nos. 10 and 12 assist No. 4 in working the whip, † hauling off hawser, &c.

[In working the apparatus with only six men, Nos. 3 and 5 assist No. 6 to raise triangle and attend to hawser; Nos. 1, 2, and 4 attend to the whip.]

Connections being made, Nos. 1, 2, and 3, assisted by even numbers of auxiliaries, haul out hawser and life-car or breeches buoy.

"Haul Ashore."

Nos. 1, 3, and 4, assisted by even numbers of auxiliaries, man the hauling side of whip.

No. 2 attends veering part, assisted if necessary by an auxiliary number. As persons are landed, No. 8 and spare numbers attend to them.

When the service or exercise is over the stores are to be returned to the cart, the party fall in to the order of march and return to the station.

Mortar Drill.

[NOTE.—The chamber or bore of the mortar should be wiped clear of all sand or dirt before it is used. In loading, raise the muzzle and pour the powder into the chamber until it is full. When practicable the charge should be covered with paper of sufficient size to fit the bore snugly over the chamber. Two spiral wires should be attached securely to the shot, and the shot lowered down on the charge. The shot line should be made fast to the spiral wires by firmly splicing it in the eyes of the wires. The sand should then be dug away, until the bedpiece of the mortar lies level. This gives the proper elevation for throwing a line from 350 to 400 yards; if no spiral wires are on hand the line may be fastened to the shot after wetting two or three feet of the line. When all is ready for firing, a quick-match will be put into the vent.]

Words of command, numbers, and stations same as for rocket drill, except that the word *mortar* is substituted for *rocket*.

Providing Stores.

No. 1—Mortar and bed, tube box, (containing tubes and primers, priming wire and powder flask.)

No. 2—Mortar and bed with No. 1, then balls, port-fires, and spiral wires.

† When working the whip keep the veering part well separated from the hauling part, the parties at each standing as far apart as possible, the hawser being between the two. Lift the whip well in order to keep clear of surf or seaweed &c.

No. 3—Shot line, hauling line, and tallies, two tail-blocks, (one on whip and one to spare.)

No. 4—Straps, signal flag (or lantern if at night,) and tarpaulin.

No. 5—Hawser, tally, and triangle or crotch.

No. 6—Anchor, tackle, pickaxe, shovel, life-car or breeches buoy.

The Captain—a flask of spirits from the medicine chest to revive the ship-wrecked if necessary.

All auxiliaries are to assist in carrying stores from the point of action.

Duties at the Command "Halt, "Action."

No. 1 places and levels mortar and bed, with the assistance of No. 2, cleans bore and chamber, loads with powder and ball, cleans vent, primes, and sees all clear.

No. 2 assists No. 1 in levelling and placing mortar and bed, attaches spiral wires to shot, lowers shot into mortar, and fastens shot line to spiral wires.

Duties of other numbers same as in rocket drill.

At the words "Ready," "Fire," "Bend on," "Haul out," and "Haul ashore," the duties of all numbers are the same as in the rocket drill.



Towing of Life Boats.

On no account must any life-boat be towed, either by a steamer or sailing-vessel, without her crew being in her, or at least a sufficient number of men to manage her, in the event of her breaking adrift, or having to cast off from the towing vessel.

A life boat may be towed by either one or two ropes. If the former be adopted, it is recommended to tow with a long scope, from forty to sixty fathoms, the tow-rope being rove through a fair-leader or lizard at the stem-head, and screwed to a bollard shipped in the trunk or tabernacle of the foremast.

If towed with two ropes, one from each quarter of the towing-steamers, they should not be taken to the stem of the boat, but be made fast, one to each bow, for which purpose some-life-boats are fitted with a bollard on each bow. In either case, the crew should be seated well aft in the boat to weigh her by the stern, excepting one man forward with a small hatchet by him, ready to cut the tow rope in a moment if it should become necessary.

A life-boat will always be found to tow better against a heavy head-sea than from one, as there will be a more steady and regular strain on her, and she will tow less wildly, and therefore with less violent jerks and strains on the tow-rope.

Great advantage is found, when towing a life-boat before a heavy sea, by towing a drogue astern of the boat, to prevent her running ahead in front of a sea. (at risk of damage against the towing vessel,) and to keep up a more equable strain on the tow rope.

RULES

FOR THE

Management of Open Row-Boats

IN A SURF—BEACHING THEM, &c.

RULES OF MANAGEMENT.

I. In rowing to Seaward.

As a general rule, speed must be given to a boat rowing against a heavy surf. Indeed, under some circumstances, her safety will depend on the utmost possible speed being attained on meeting a sea. For if the sea be really heavy, and the wind blowing a hard, on shore gale, it can only be by the utmost exertions of the crew that any headway can be made. The great danger then is, that an approach-heavy sea may carry the boat away on its front, and turn it broadside on, or up-end it, either effect being immediately fatal. A boat's only chance in such a case is to obtain such way as shall enable her to pass, end on, through the crest of the sea, and leave it as soon as possible behind her. Of course, if there be a rather heavy surf, but no wind, or the wind off shore, and opposed to the surf, as is often the case, a boat might be propelled so rapidly through it that her bow would fall more suddenly and heavily after topping the sea than if her way had been checked, and it may, therefore, only be when the sea is of such magnitude, and the boat of such a character, that there may be a chance of the former carrying her back before it, that full speed should be given to her.

It may also happen that, by careful management under such circumstances, a boat may be made to avoid the sea, so that each wave may break ahead of her, which may be the only chance of safety in a small boat; but if the shore be flat, and the broken water extend to a great distance from it, this often will be impossible.

The following general rules for rowing to seaward may, therefore be relied on:

1. If sufficient command can be kept over a boat by the skill of those on board her, avoid or "dodge" the sea, if possible, so as not to meet it at the moment of its breaking or curling over.

2. Against a head gale and heavy surf, get all possible speed on a boat on the approach of every sea which cannot be avoided.

3. If more speed can be given to a boat than is sufficient to prevent her being carried back by a surf, her way may be checked on its approach, which will give her an easier passage over it.

II. On Running Before a Broken Sea, or Surf, to the Shore.

The one great danger, when running before a broken sea, is that of *broaching-to*. To that peculiar effect of the sea so frequently destructive of human life, the utmost attention must be directed.

The cause of a boat's broaching-to when running before a broken sea or surf, is, that her own motion being in the same direction as that of the sea, whether it be given by the force of oars or sails, or by the force of the sea itself, she opposes no resistance to it, but is carried before it. Thus, if a boat be running with her bow to the shore and her stern to the sea, the first effect of the surf or roller, on its overtaking her, is to throw up the stern, and as a consequence to depress the bow; if she then has sufficient inertia (which will be proportional to weight) to allow the sea to pass her, she will in succession pass through the descending, the horizontal, and the ascending positions, as the crest of the wave passes successively her stern, her midships, and her bow, in the reverse order in which the same positions occur to a boat propelled to seaward against a surf. This may be defined as the safe mode of running before a broken sea.

But if a boat, on being overtaken by a heavy surf, has not sufficient inertia to allow it to pass her, the first of the three positions above enumerated alone occurs; her stern is raised high in the air, and the wave carries the boat before it, on its front or unsafe side, sometimes with frightful velocity, the bow all the time deeply immersed in the hollow of the sea, where the water, stationary or comparatively so, offers a resistance, whilst the crest of the sea, having the actual motion which causes it to break, forces onward the stern or rear end of the boat. A boat will, in this position sometimes, aided by careful oar-steerage, run a considerable distance until the wave has broken and expended itself. But it will often happen that if the bow be low it will be driven under water, when the buoyancy being lost forward, whilst the sea presses on the stern, the boat will be thrown (as it is termed) end over end; or if the bow be high, or it be protected, as in most life-boats, by a bow air-chamber, so that it does not become submerged, that the resistance forward, acting on one bow, will slightly turn the boat's head, and the force of the surf being transferred to the opposite quarter, she will in a moment be turned round broadside by the sea, and be thrown by it on her beam-ends or altogether capsized. It is in this manner that most boats are upset in a surf, especially on flat coasts, and in this way many lives are annually lost amongst merchant seamen when attempting to land after being compelled to desert their vessels.

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Hence, it follows, that the management of a boat, when landing through a heavy surf, must as far as possible, be assimilated to that when proceeding to seaward against one, at least so far as to stop her progress shoreward at the moment of being overtaken by a heavy sea, and thus enabling it to pass her. There are different ways of effecting this object :

1. By turning a boat's head to the sea before entering the broken water, and then backing in stern foremost, pulling a few strokes ahead to meet each heavy sea, and then again backing astern. If a sea be really heavy and a boat small this plan will be generally the safest, as a boat can be kept more under command when the full force of the oars can be used against a heavy surf than by backing them only.

2. If rowing to shore with the stern to seaward, by backing all the oars on the approach of a heavy sea, and rowing ahead again as soon as it has passed to the bow of the boat, thus rowing in on the back of the wave ; or, as is practised in some life-boats, placing the after oarsmen with their faces forward and making them row back at each sea on its approach.

3. If rowed in bow foremost, by towing astern a pig of ballast or large stone, or a large basket, or a canvas-bag, termed a "drogue" or drag, made for the purpose, the object of each being to hold the boat's stern back, and prevent her being turned broadside to the sea or broaching-to.

Drogues are in common use by the boatmen on the Norfolk coast ; they are conical shaped bags of about the same form and proportionate length and breadth as a candle-extinguisher, about two feet wide at the mouth and four and a half feet long. They are towed with the mouth foremost by a stout rope ; a small line termed a tripping-line, being fast to the apex or pointed end. When towed with the mouth foremost they fill with water and offer a considerable resistance, thereby holding back the stern ; by letting go the stouter rope and retaining the smaller line their position is reversed, when they collapse, and can be readily hauled into the boat.

Drogues are chiefly used in sailing-boats, when they both serve to check a boat's way and to keep her end on to the sea. They are, however, a great source of safety in rowing-boats, and the rowing life-boats of the National Life-Boat Institution are now provided with them.

A boat's sail bent to a yard and towed astern loosed, the yard being attached to a line capable of being veered, hauled, or let go, will act in some measure as a drogue, and will tend much to break the force of the sea immediately astern of the boat.

Heavy weights should be kept out of the extreme ends of a boat ; but when rowing before a heavy sea the best trim is deepest by the stern, which prevents the stern being readily thrown on one side by the sea.

A boat should be steered by an oar over the stern, or on one quarter when running before a sea, as the rudder will then at times be of no use. If the rudder be shipped, it should be kept amidships on a sea breaking over the stern.

The following general rules may therefore be depended on when running before, or attempting to land, through a heavy surf or broken water :

1. As far as possible avoid each sea by placing the boat where the sea will break ahead or astern of her.
2. If the sea be very heavy, or if the boat be very small, and especially if she have a square stern, bring her bow round to seaward and back her in, rowing ahead against each heavy surf that cannot be avoided sufficiently to allow it to pass the boat.
3. If it be considered safe to proceed to the shore bow foremost, back the oars against each sea on its approach, so as to stop the boat's way through the water as far as possible, and if there is a drogue, or any other instrument in the boat which may be used as one, tow it astern to aid in keeping the boat end to the sea, which is the chief object in view.
4. Bring the principal weights in the boat towards the end that is to seaward, but not to the extreme end.
5. If a boat, worked by both sails and oars, be running under sail for the land through a heavy sea, her crew should, under all circumstances, unless the beach be quite steep, take down her masts and sails before entering the broken water, and take her to land under oars alone, as above described. If she have sail only, her sails should be much reduced, a half-lowered foresail or other small head-sail being sufficient.

III. Beaching or Landing Through a Surf.

The running before a surf or broken sea, and the beaching or landing of a boat, are two distinct operations ; the management of boats as above recommended has exclusive reference to running before a surf where the shore is so flat that the broken water extends to some distance from the beach. Thus, on a very steep beach, the first heavy fall of broken water will be on the beach itself, whilst on some very flat shores there will be broken water as far as the eye can reach, sometimes extending to even four or five miles from the land. The outermost line of broken water, on a flat shore, where the waves break in three and four fathoms water, is the heaviest, and therefore the most dangerous ; and, when it has been passed through in safety, the danger lessens as the water shoals, until, on nearing the land, its force is spent and its power harmless. As the character of the sea is quite different on steep and flat shores, so is the customary management of boats on landing different in the two situations. On the flat shore, whether a boat be run or backed in, she is kept straight before or end on to the sea until she is fairly aground, when each surf takes her further in as it overtakes her, aided by the crew, who will then generally jump out to lighten her and drag her in by her sides. As above stated, sail will in this case have been previously taken in if set, and the boat will have been rowed or backed in by oars alone.

On the other hand, on the *steep* beach it is the general practice, in a boat of any size, to retain speed right on to the beach, and in the act of landing, whether

under oars or sail, to turn the boat's bow half round towards the direction from which the surf is running, so that she may be thrown on her broadside on the beach, where abundance of help is usually at hand to haul her as quickly as possible out of the reach of the sea. In such situations, we believe, it is nowhere the practice to back a boat in sternforemost under oars, but to row in under full speed as above described.

IV. Boarding a Wreck, or a Vessel, under Sail or at Anchor, in a Heavy Sea.

The circumstances under which life-boats or other boats have to board vessels, whether stranded or at anchor, or under way, are so various that it would be impossible to draw up any general rule for guidance. Nearly everything must depend on the skill, judgment, and presence of mind of the coxswain or officer in charge of the boat, who will often have those qualities taxed to the utmost, as undoubtedly the operation of boarding a vessel in a heavy sea or surf is frequently one of extreme danger.

It will be scarcely necessary to state that, whenever practicable, a vessel, whether stranded or afloat, should be boarded to leeward, as the principal dangers to be guarded against must be the violent collision of the boat against the vessel, or her swamping or upsetting by the rebound of the sea, or by its irregular direction on coming in contact with the vessel's side; and the greater violence of the sea on the windward side is much more likely to cause such accidents. The danger must, of course, also be still further increased when the vessel is aground and the sea breaking over her. The chief danger to be apprehended on boarding a stranded vessel on the lee side, if broadside to the sea is the falling of the masts; or if they have been previously carried away, the damage or destruction of the boat amongst the floating spars and gear alongside. It may therefore, under such circumstances, be often necessary to take a wrecked crew into a life-boat from the bow or stern; otherwise a rowing-boat, proceeding from a lee shore to a wreck, by keeping under a vessel's lee, may use her as a breakwater, and thus go off in comparatively smooth water, or be at least shielded from the worst of the sea. This is, accordingly, the usual practice in the rowing life-boats around the United Kingdom. The larger sailing life-boats, chiefly on the Norfolk and Suffolk coasts, which go off to wrecks on outlying shoals, are, however, usually anchored to windward of stranded vessels, and then veered down to 100 or 150 fathoms of cable, until near enough to throw a line on board. The greatest care, under these circumstances, has, of course, to be taken to prevent actual contact between the boat and the ship, and the crew of the latter have sometimes to jump overboard and to be hauled to the boat by ropes.

In every case of boarding a wreck or a vessel at sea, it is important that the lines by which a boat is made fast to the vessel should be of sufficient length to allow of her rising or falling freely with the sea; and every rope should be kept

in hand ready to cut or slip it in a moment if necessary. On wrecked persons or other passengers being taken into a boat in a sea way, they should be placed on the thwarts in equal numbers on either side, and be made to sit down. All crowding or rushing headlong into the boat should be prevented as far as possible ; and the captain of a ship, if a wreck, should be called on to remain on board to preserve order until every other person had left her.



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DIRECTIONS

FOR

Saving Drowning Persons.

BY SWIMMING TO THEIR RELIEF.

1. When you approach a person drowning in the water assure him, with a loud and firm voice, that he is safe.

2. Before jumping in to save him, divest yourself as far and as quickly as possible of all clothes; tear them off, if necessary; but if there is not time, loose at all events the foot of your drawers, if they are tied, as, if you do not do so, they fill with water and drag you.

3. On swimming to a person in the sea, if he is struggling, do not seize him, then, but keep off for a few seconds till he gets quiet, for it is sheer madness to take hold of a man when he is struggling in the water, and if you do you run a great risk.

4. Then get close to him and take fast hold of the hair of his head, turn him as quickly as possible on to his back, give him a sudden pull, and this will cause him to float, then throw yourself on your back also and swim for the shore, both hands having hold of his hair, you on your back and he also on his, and of course his back to your stomach. In this way you will get sooner and safer ashore than than by any other means, and you can easily thus swim with two or three persons; the writer has even, as an experiment, done it with four, and gone with them forty or fifty yards in the sea. One great advantage of this method is that it enables you to keep your head up, and also to hold the persons head up you are trying to save. It is of primary importance that you take fast hold of the hair and throw both the person and yourself on your backs. After many experiments it is usually found preferable to all other methods. You can in this manner float nearly as long as you please, or until a boat or other help can be obtained.

5. It is believed there is no such thing as a death-grasp; at least it is very unusual to witness it. As soon as a drowning man begins to get feeble and to lose his recollection, he gradually slackens his hold until he quits it altogether. No

apprehension need therefore, be felt on that head when attempting to rescue a drowning person.

6. After a person has sunk to the bottom, if the water be smooth, the exact position where the body lies may be known by the air-bubbles, which will occasionally rise to the surface, allowance being of course made for the motion of the water, if in a tide-way or stream, which will have carried the bubbles out of a perpendicular course in rising to the surface. A body may be often regained from the bottom, before too late for recovery, by diving for it in the direction indicated by these bubbles.

7. On rescuing a person by diving to the bottom, the hair of the head should be seized by one hand only, and the other used, in conjunction with the feet, in raising yourself and the drowning person to the surface.

8. If in the sea it may sometimes be a great error to try to get to land. If there be a strong "outsetting" tide, and you are swimming either by yourself, or having hold of a person who cannot swim, then get on your back and float till help comes. Many a man exhausts himself by stemming the billows for the shore on a back-going tide, and sinks in the effort, when, if he had floated, a boat or other aid might have been obtained.

9. These instructions apply alike to all circumstances, whether as regards the roughest sea or smooth water.

NOTE.—The following life-saving stations are in contemplation: Two complete life-saving stations on the coast of Lake Michigan, to be located, one at or near Sleeping Bear Point, and one at or near Bayley's Harbor, and four life-boat stations, to be located one at or near Manistee, and one at Ludington; one at or near Muskegon, and one at Kenosha; one life-boat station on the coast of Lake Superior, at or near the mouth of Portage Lake and Lake Superior Ship Canal; two complete life-saving stations on the coast of Lake Huron, one at or near Port Austin and one on Middle Island, and a life-boat station at or near Sand Beach Harbor of Refuge.

NOTE.—Station No. 4 will be on Thunder Bay Island instead of north point of Thunder Bay.

The stations on Lake Superior are in commission from May 15th until the close of navigation, and on the rest of the lakes from April 1st till the first of June, and again from the first of September to the close of navigation. Our vessel owners and merchant marine men generally favor the continuous operation of the service throughout the entire season of navigation on all the lakes.

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DIRECTIONS

FOR

Restoring the Apparently Drowned.

RULE I. Arouse the patient.—Unless in danger of freezing, do not move the patient, but expose the face to a current of fresh air, wipe dry the mouth and nostrils, rip the clothing, so as to expose the chest and waist, and give two or three quick smarting slaps on the stomach and chest with the open hand. If the patient does not revive, then proceed thus :

RULE II. To draw off water, &c., from the stomach and chest.—(See Fig. I.)—



Fig. I. Showing the first step taken, by which the chest is emptied of air, and the ejection of any fluids swallowed is assisted.

If the jaws are clenched, separate them, and keep the mouth open by placing between the teeth a cork or small bit of wood; turn the patient on the face, a large

bundle of tightly-rolled clothing being placed beneath the stomach, and press heavily over it for half a minute, or so long as fluids flow freely from the mouth.

RULE III. *To produce breathing.*—(See Fig. II.)—Clear the mouth and throat

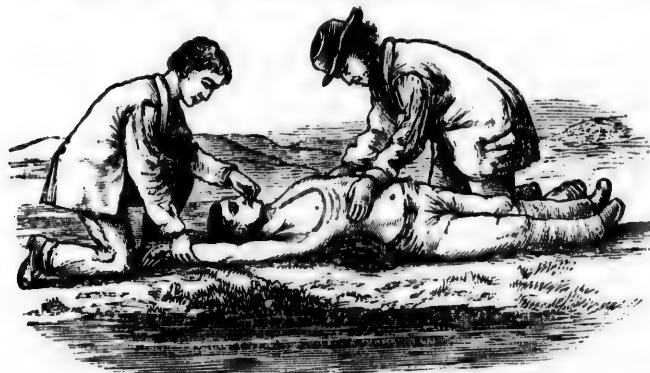


Fig. II. *Showing the position and action of the operator, in alternately producing artificial expiration and inspiration of air.*

of mucus, by introducing into the throat the corner of a handkerchief wrapped closely around the forefinger; turn the patient on the back, the roll of clothing being so placed beneath it as to raise the pit of the stomach above the level of any other part of the body. If there be another person present, let him, with a piece of dry cloth, hold the tip of the tongue out of the corner of the mouth, (this prevents the tongue from falling back and choking the entrance to the windpipe,) and with the other hand grasp both wrists and keep the arms forcibly stretched back above the head, thereby increasing the prominence of the ribs, which tends to enlarge the chest. The two last-named positions are not, however, essential to success. Kneel beside or astride the patient's hips, and with the ball of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves between the short ribs, so as to afford the best grasp of the waist. Now, using your knees as a pivot, throw all your weight forward on your hands, and at the same time squeeze the waist between them, as if you wished to force everything in the chest upward out of the mouth; deepen the pressure while you can count slowly one, two, three; then suddenly let go with a final push, which springs you back to your first kneeling position. Remain erect on your knees while you can count one, two, three; then repeat the same motions as before at a rate gradually increased from four or five to fifteen times in a minute, and continue thus this bel- lows movement with the same regularity that is observable in the natural motions of breathing which you are imitating. If natural breathing be not restored, after

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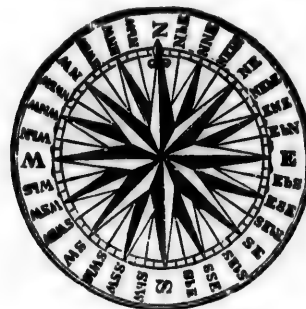
a trial of the bellows movement for the space of three or four minutes, then, with out interrupting the artificial respiration, turn the patient a second time on the stomach, as directed in Rule II, rolling the body in the opposite direction from that in which it was first turned, for the purpose of freeing the air-passages from any remaining water. Continue the artificial respiration from one to four hours, or until the patient breathes; and for a while, after the appearance of returning life, carefully aid the first short gasps until deepened into full breaths. Continue the drying and rubbing, which should have been unceasingly practised from the beginning, taking care not to interfere with the means employed to produce breathing. Thus the limbs of the patient should be rubbed, always in an upward direction towards the body, with firm-grasping pressure and energy, using the bare hands, dry flannels or handkerchiefs, and continuing the friction under the blankets or over the dry clothing. The warmth of the body can also be promoted by the application of hot flannels to the stomach and arm-pits, bottles or bladders of hot water, heated bricks, &c., to the limbs and soles of the feet.

RULE IV. AFTER-TREATMENT.—*Externally*: As soon as breathing is established let the patient be stripped of all wet clothing, wrapped in blankets only, put to bed comfortably warm, but with a free circulation of fresh air, and left to perfect rest. *Internally*: Give a little brandy and hot water, or other stimulant at hand, every ten or fifteen minutes for the first hour, and as often thereafter as may seem expedient. *Later manifestations*: After reaction is fully established, there is great danger of congestion of the lungs, and if perfect rest is not maintained for at least forty-eight hours, it sometimes occurs that the patient is seized with great difficulty of breathing, and death is liable to follow unless immediate relief is afforded. In such cases apply a large mustard-plaster over the breast. If the patient gasps for breath before the mustard takes effect, assist the breathing by carefully repeating the artificial respiration.

NOTE.—An eminent authority, Dr. Labordette, the Supervising Surgeon of the Hospital of Lisieux, in France, appears to have established that the clenching of the jaws and the semi-contraction of the fingers, which have hitherto been considered signs of death, are, in fact, evidences of remaining vitality. After numerous experiments with apparently drowned persons, and also with animals, he concludes that these are only signs accompanying the first stage of suffocation by drowning, the jaws and hands becoming relaxed when death ensues.* This being so, the mere clenching of the jaws and semi-contraction of the hands must not be considered as reasons for the discontinuance of efforts to save life, but should serve as a stimulant to vigorous and prolonged efforts to quicken vitality. Persons engaged in the tasks of resuscitation are, therefore, earnestly desired to take hope and encouragement for the life of the sufferer, from the signs above referred to, and to continue their endeavors accordingly. In a number of cases Dr. Labor-dette restored to life persons whose jaws were so firmly clenched that, to aid respiration, their teeth had to be forced apart with iron instruments.

* The muscular rigidity of death (*rigor mortis*) occurs later, after the temporary relaxation here referred to.

Additions and Corrections.



Laws for Vessels in Fogs.

Of all the laws regulating navigation none are more ignored or imperfectly understood by sailors than those for vessels in a fog. That vessels when lying to or at anchor must sound a bell does not seem to be generally understood, and that our readers may become fully conversant, they are here reproduced in full :

Every steamer, when under way, shall use a steam whistle. Sailing vessels and all other craft propelled by sails, shall use a fog horn.

Whenever there is a fog, whether by day or night, the fog signals described below shall be sounded.

Sailing vessels, and every craft propelled by sails, upon the oceans, lakes and rivers shall, when on their starboard tack, sound one blast of their fog horn ; when on their port tack they shall sound two blasts of their fog horn ; when, with the wind free or running large, they shall sound three blasts of their fog horn ; when lying to or at anchor they shall sound the bell. In each instance the above signals shall be sounded at intervals of not more than two minutes.

Sailing vessels, when not under way and anchored or moored in the channel or fairway of commerce, shall sound the bell signal at intervals of

not more than two minutes, and all steamers navigating in a fog or thick weather shall, by the rules governing pilots, sound their steam whistle at intervals of not more than one minute.

Sailing vessels shall at all times, on the approach of any steamer during the night-time, show a lighted torch upon that point or quarter to which such steamer shall be approaching. And upon any craft navigating rivers without being in tow of a steamer, such as rafts, flat boats, wood boats and other like craft, they shall sound a fog horn at intervals of not more than two minutes.

It shall at all times be the duty of steamers to give to the sailing vessel, or other craft propelled by sails, every advantage and keep out of her way.

Toronto, Lake Ontario. Five feet water can be carried into the bay through the eastern gap.

Oswego Breakwater. The breakwater runs out from the shore N 5° 32' E 900 feet, and from this point it runs north 59° 53' east. The finished part of the breakwater is about 2500 feet, and is 1000 feet NNW from shore line, and when completed will be 4900 feet long, and will then bear from the light on the end of the west pier SSE ¼ E about 700 feet. The depth of water going in is 18 feet, and the same under that part of the breakwater that is finished. Dredging and other improvements are going on at the west end of this outer harbor. Page 31.

Page 41.—Silver Creek to Dunkirk NNW 1 mile; thence WSW 29 miles.

Page 56.—To enter Detroit River by the American Channel, leave out Bar Point in first line.

Page 48.—From Bois Blanc Lighthouse to Cleveland. Run out four miles S ¼ W from Bois Blanc Lighthouse; thence ESE 11 ¼ miles to abreast of Little's Point, bearing N 1 ¼ miles; thence SE by E ¼ E 73 ¼ miles, to Cleveland, leaving Colchester Reef light ship, red light, one mile to starboard, and Point Pelee Island Lighthouse 1 ¼ miles to southward.

From Detroit River to Point Pelee. Second line read bearing *north* instead of *east*.

Page 60.—Sand Beach, Harbor of Refuge. Read on the sixteenth line: thence along shore at the distance of 1 ¼ miles; leaving out 1500 feet from piers.

Page 66.—From Presqu'île North Point Lighthouse. Third line. You leave Spectacle Reef Lighthouse 4 miles to the northward.

April 15, 1878.—Soundings at Chicago by Harbor Master Carey. From Rush Street Bridge out to slip A, 14 ¼ feet water, and from slip A to the main lighthouse 15 feet water. The outer harbor 12 ¼ to 14 feet water.

The north end is full of holes and the bottom uneven. These soundings are only an average. The water rises and falls from 6 inches to a foot and a half, and more, by the atmospheric pressure outside, and from distant parts of the lake, at short intervals. Vessels running under the breakwater in a NE gale, will find the water high, and should, if drawing 14 feet water, get into the river as soon as the gale slackens up.

Portage Canal, Lake Superior. The depth of water is reported to be at this date only $9\frac{1}{2}$ feet; but the water generally rises about the latter part of June. Dredging is going on at this harbor.

Palermo Harbor, Lake Huron, is $4\frac{1}{4}$ miles west of Presqu'île Point, bearing N $\frac{1}{4}$ of a mile; run on this course until you open the bay, and steer in SSW. The soundings are gradual from 7 to 3 fathoms. In making the harbor from the eastward, you run past the east point of the bay, and give the point a berth of $\frac{1}{2}$ and $\frac{1}{8}$ of a mile, as the water is only 6 feet $\frac{1}{2}$ mile from the point, in a NW line from it. Keep on this course till you open the dock on the east side of the bay; then run in SE $\frac{1}{2}$ S until near abreast of the dock, and come to anchor or run alongside the dock. This dock has 11 feet water on the outside and 6 feet on the inside; is 150 feet long with an elbow, and lays NW and SE. Owned by Brownlee & Co. Buoys are placed in the channel, painted red and black. From Brownlee's Dock to Adams' Point 3 miles. Adams' Point to Crawford's Quarry $1\frac{1}{2}$ miles. To run out to the westward when 200 yards from Brownlee's Dock, haul up N W $\frac{1}{2}$ N.

The two piers at Devil River, or Osenic, Thunder Bay, Lake Huron, run out north and south. Eleven feet water.

Campbel's Dock, outside Alpena Harbor. Runs out ESE and WNW. Twelve to fourteen feet water.

Black River pier runs out SW and NE. To run to this dock, make Black River Island pretty close to to starboard, and range the lights, which are in a diagonal line on the pier; run to the dock on the range, which is about SSW, leaving a bunch of spiles to starboard, in 12 feet water, and another bunch of spiles near the end of the pier to port in 12 feet water. The depth of water alongside the outer part of the pier is 10 to 11 feet. A reef makes off from the land a little to the southward of the pier, extending nearly one mile, which makes a good lee from southerly winds, and if the water was deepened around the pier end it would make a good harbor.

Alcona Docks, north of Sauble river. Run out WbyS $\frac{1}{2}$ S and EbyN $\frac{1}{2}$ N. Twelve to 14 feet water. Loud, Gay & Co's. Mills.

Pier at Old Mackinaw runs out EbyN $\frac{1}{4}$ N and WbyS $\frac{1}{2}$ S. Fourteen feet water.

Point St. Ignace, East Moran Bay, has a saw mill and two docks. The south one has a T across the end, with 12 to 14 feet water, and is a fishing station.

Norwood, in East Traverse Bay has a good dock, with 14 feet water. Wood of the best quality is shipped from this place.

Docks in Green Bay.

Docks at Menomonee, outside, lay WSW and ENE. Fourteen feet water. Eleven feet water can be carried into the river, where improvements are going on every season.

The dock at Oconto runs out SWbyW $\frac{1}{2}$ W. Fourteen feet water. Vessels load to anchor.

Docks at Big Sturgeon Bay lay along shore SSE and NNW. Twelve feet water.

Washington Harbor, 7 miles from Rock or Louse Island Lighthouse. Headquarters for fishermen. Is open to the NE. Has a dock on each side of the bay, near the head. (Furlong & Son.) Fourteen feet water alongside. Vessels can lay to anchor in 11 fathoms water, soft bottom, a little to the southward of Furlong's Dock, which is on the west side. I have laid here in a heavy gale from the NE with a long scope of cable in perfect safety.

Fayette, Snail Shell Harbor, east side of Big Bay De Noc. This harbor has good docks, plenty of water alongside, and a furnace.

Katt's Bay, a few miles to the northward, and near the head of Big Bay De Noc, has good holding ground, and is safe from all winds. There are good farms in this vicinity.

Kaministiquia River, Thunder Bay, Lake Superior. The water in this river is reported to be only 10 feet this spring.

The number of lighthouses on the lakes from Odensburg to Duluth: On the American side of the lakes are 184, three of which are not yet finished.

The number of lighthouses on the Canada side from Prescott to Fort William on Lake Superior are 82, two of which are not yet finished.

From White Fish Point to first life saving station, 8 miles; from first station to the second station, 7 miles; from second station to the third station, 8 miles.

Kincardine Harbor east side of Lake Huron. The piers run out WS W and ENE. Range lights on the north pier. Red in front and white in rear. There is a square basin on the south side after entering the piers, abreast the inner light. The end of both piers run off to an angle of about two points from the range only a short distance.

Page 151.—Leaving the beacon light on Grand Island. Last line; the channel, etc., 3 to 4 fathoms deep.

A red light in conjunction with a white light will be shown from the end of Whittemore's dock, Tawas Bay.

Page 75.—From mouth St. Clair River to Point Clark NNE easterly 82 miles, bearing east 3 miles.

Page 78.—Top line: Island W½N 60 miles.

The following notice is given to captains and mariners entering Rondeau Harbor: "On entering the harbor as you pass the range light on the north end of the east pier drop in range of the said pier and go in about from 40 to 60 rods, bringing the dwelling house and lighthouse in range, then let go your anchor and you will have from 14 to 16 feet water and good anchorage. But keep clear of the west side after you pass the west pier, as it is filling up from the west gap very fast, and you cannot pass in a range with it and have more than 3 or 4 feet of water. There will be bushes or poles stuck at the edge of the dredged water to show where it is, and at a sunken crib close to the east pier. The light keeper will always be happy to give instructions and a helping hand when required."



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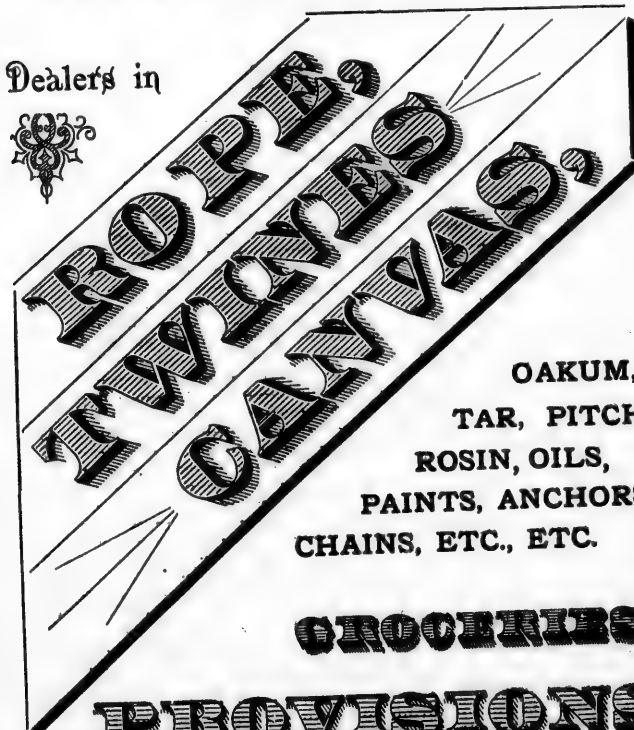
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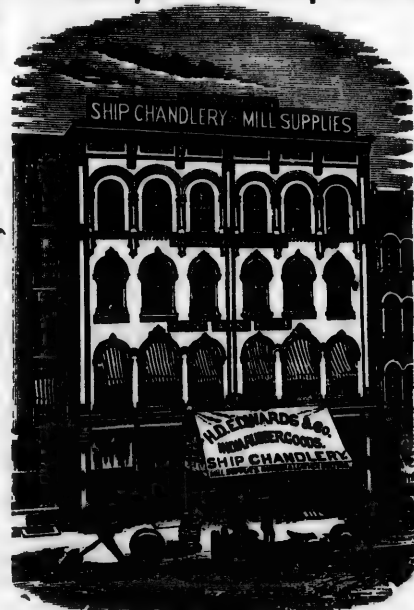
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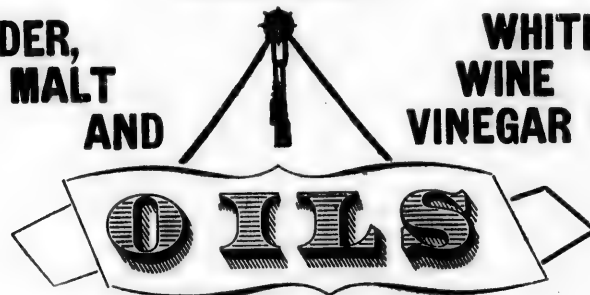
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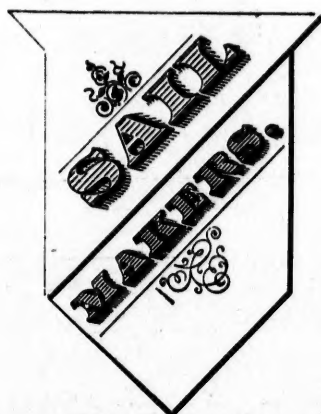
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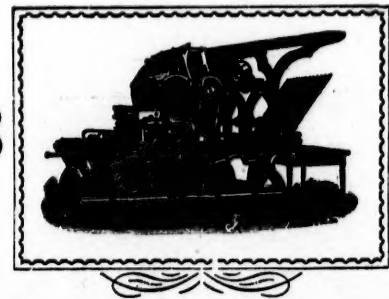
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